IBM's Smarter Cities Challenge

Knoxville

Report

IBM

Contents

1. Executive summary

Introduction

In 2012, IBM selected the City of Knoxville, Tennessee, USA, as one of 31 cities to receive an IBM Smarter Cities Challenge® grant as part of IBM's citizenship efforts to build a Smarter Planet®. Madeline Rogero, Mayor of Knoxville, and her senior leadership team wished to:

Utilize the skills and expertise of a talented IBM team to brainstorm a way to track and measure emergency energy services and to recommend the best way to systematically improve Knoxville's older housing stock accordingly.

In response to this challenge, in May 2013 a team of five global IBM experts worked together to provide recommendations for the City.

Background

Knoxville has an aging housing infrastructure that consumes energy in excess, often leaving residents with utility bills too large for them to pay and resulting in a drawdown of resources from supporting agencies. The cycle wastes millions of dollars annually and will continue to do so unless corrected.

More homes in Tennessee use electrical heat than in any other part of the country, and Knoxville is no different. Much of the city's older housing stock was poorly insulated, if at all; electricity was cheap when it was built in the 1940s and 1950s. These homes are now occupied by low-income residents, for whom Knoxville funds substantial emergency utility bill payments.

The City of Knoxville does provide funds to weatherize housing to help reduce utility bills, but like all Tennessee communities, from large to small, it faces a constant funding challenge. Current funding is not sustainable or perpetual. For example, American Recovery Reinvestment Act of 2009 (ARRA) funds for the Weatherization Assistance Program ended on 30 June 2012; the $6.2 million that was provided to Knox County as part of this federal stimulus package has been exhausted.

In the past year, millions of dollars from local community organizations have funded utility assistance programs. These programs are designed to alleviate the financial pressure experienced by low-income families, rehabilitated citizens and people who have recently been or are in immediate danger of becoming homeless. The Refuge, Salvation Army, Community Action Center, Low Income Home Energy Assistance Program (LIHEAP) and Project Help all provide assistance funds to Knoxville Utilities Board (KUB) clients. In 2012, the City of Knoxville tracked payments from these five organizations totaling $3,280,319.75. This money assisted 9,670 households with their utility bills, averaging $339.23 utility benefits per household, as illustrated in the table below.

Organization	Amount spent on utility assistance	Household assisted	Average amount spent per household
The Refuge	$33,956.40	583	$58.24
Salvation Army	$35,754.00	410	$87.20
CAC	$121,910.78	175	$696.63
LIHEAP	$2,988,098.57	8,100	$368.90
Project Help	$100,600.00	402	$250.25
Total	**$3,280,319.75**	**9,670**	**$339.23**

Table 1:
Financial contributions to KUB from government and community organizations tracked by City of Knoxville

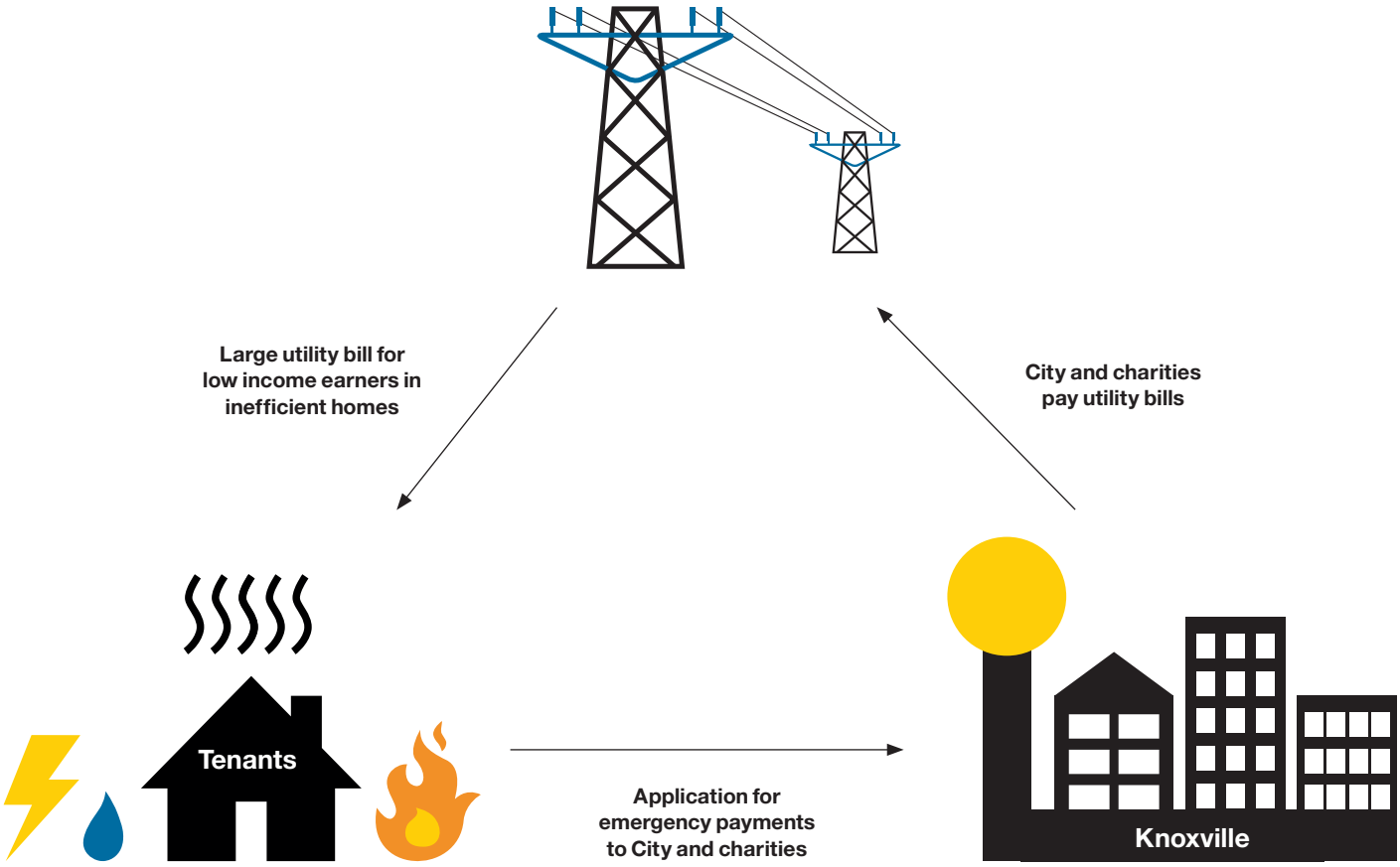


Figure 1:
Cycle of utility inefficiency

However, in stakeholder interviews with KUB, the Smarter Cities Challenge team learned that KUB reported payments of $4,846,000 in 2012. This amount included contributions from any agency or payer, including the faith-based community.

None of these funds were applied to weatherization or education services. Utility energy efficiency programs do not currently target or adequately incentivize low-income landlords or individual homeowners.

The challenge

The City of Knoxville recognizes the need for a system that connects its network of emergency utility bill services to the solution: weatherization and energy education. In applying for a grant from IBM, the City wanted an outside-in perspective to help resolve the following challenges:

- Multiple sources of data, each with its own rules and definitions
- A lack of integrated data leading to limited fact-based decision making
- Many voices with no common vision
- Inadequate funding sources that are disparate and not always easy to access

- A lack of collaboration across parties, policymakers, citizens, higher education institutions, businesses and investors
- Limited weatherization and energy efficiency education resources that are not well funded, coordinated or actively promoted
- Many low-income housing landlords not actively weatherizing properties because of a lack of regulation, incentives and/or interest in the issue

The City asked the global IBM Smarter Cities Challenge team to create a new systematic approach to an old problem; one that will generate better data and give City leaders tools to optimize their use of limited resources, make better decisions and best target their interventions.

The team's expertise across a diverse set of disciplines enabled it to approach the challenges in new and innovative ways. Bringing an alternative view to analyzing problems and developing solutions, the team worked with many different stakeholders to gain required buy-in and momentum.

Findings and recommendations

For three weeks, the team worked together to understand the issues, assess the options and deliver recommendations and a roadmap to the City. It conducted more than 50 formal interviews with 29 stakeholder groups representing the public, private and education sectors. Combining interview insights with an assessment of energy efficiency programs and best practice, the team developed the following findings:

- **Culture:** Cultural norms could be a barrier to the community working together.
- **Communication/coordination:** Areas for improvement exist, but there is a strong desire by all stakeholders to address this.
- **Data:** Data exists that could prove the business case for weatherization and link funding to needs.
- **Weatherization and education models and efforts:** There is an opportunity to leverage models used by other cities; local educational resources are interested in participating and collaborating more proactively.
- **Funding sources:** Resources are inadequate, disparate and lack ease of accessibility.
- **Landlord regulations and incentives:** Many organizations see the need to work more closely with landlords in an effort to increase their accountability and involvement.

The team developed five recommendations that work together and build off the successes of each other. The recommendations are the following:

1. **Develop one voice around a shared vision:** Improve coordination and communication
2. **Harness the data:** Enable fact-based decision making
3. **Educate the community:** Develop and implement end-to-end education campaigns
4. **Fund the program:** Create a sustainable and perpetual funding system
5. **Engage landlords:** Incentivize, collaborate with and regulate property owners

The team provided a 12-month roadmap for immediate action coupled with a governance structure to kick-start energy efficiency measures.

Conclusion

The City will achieve sustainable energy efficiency targets through its commitment to collaboration and business-friendly practices and by engaging the landlord community. The City should leverage its academic and community assets to create a long-term solution that delivers education. In the future, the City should engage all its constituents and gain buy-in for a citywide campaign to create a stronger Knoxville. Through the system of systems the City will make fact-based decisions on how to best spend its precious resources.

2. Introduction

A. The Smarter Cities Challenge

By 2050, cities will be home to more than two-thirds of the world's population. They already wield more economic power and have access to more advanced technological capabilities than ever before. Simultaneously, cities are struggling with a wide range of challenges and threats to sustainability in their core support and governance systems, including transport, water, energy, communications, healthcare and social services.

Meanwhile, trillions of digital devices, connected through the Internet, are producing a vast ocean of data. All of this information — from the flow of markets to the pulse of societies — can be turned into knowledge because we now have the computational power and advanced analytics to make sense of it. With this knowledge, cities could reduce costs, cut waste, and improve efficiency, productivity and quality of life for their citizens. In the face of the mammoth challenges of economic crisis and increased demand for services, ample opportunities still exist for the development of innovative solutions.

In November 2008, IBM initiated a discussion on how the planet is becoming "smarter". By this it meant that intelligence is becoming infused into the systems and processes that make the world work — into things no one would recognize as computers: cars, appliances, roadways, power grids, clothes, even natural systems, such as agriculture and waterways. By creating more instrumented, interconnected and intelligent systems, citizens and policymakers can harvest new trends and insights from data, providing the basis for more informed decisions.

A Smarter City uses technology to transform its core systems and optimize finite resources. Since cities grapple on a daily basis with the interaction of water, transportation, energy, public safety and many other systems, IBM is committed to a vision of Smarter Cities® as a vital component of building a Smarter Planet. At the highest levels of maturity, a Smarter City is a knowledge-based system that provides real-time insights to stakeholders and enables decision makers to manage the city's subsystems proactively. Effective information management is at the heart of this capability, and integration and analytics are the key enablers.

Intelligence is being infused into the way the world works.

As IBM aligns its citizenship efforts with the goal of building a Smarter Planet, we realize that city leaders around the world face increasing economic and societal pressures. Given the increased demand for services, they have to deliver new solutions ever more rapidly.

With this in mind, IBM Corporate Citizenship has launched the Smarter Cities Challenge to help 100 cities around the world over a three-year period become smarter through grants of IBM talent. The City of Knoxville, Tennessee, USA, was selected through a competitive process as one of 31 cities to be awarded a Smarter Cities Challenge grant in 2013.

During a three-week period in May 2013, a team of five IBM experts worked in Knoxville to deliver recommendations around key issues for Mayor Madeline Rogero.

B. The challenge

Knoxville has an aging housing infrastructure that consumes energy in excess, often leaving residents with utility bills too large for them to pay and resulting in a drawdown of resources from supporting agencies. The cycle wastes millions of dollars annually and will continue to do so unless corrected.

The City of Knoxville recognizes the need for a system that connects its network of emergency utility bill services to the solution: weatherization and energy education. In applying for a grant from IBM, the City wanted an outside-in perspective on its many challenges.

Background

In 2012, energy-related issues ranked second for the number of calls to the Knoxville 311 information and referral system. Only food assistance was asked for more frequently. In that year, the Knoxville Utilities Board (KUB) agency portal tracked close to $5 million spent on utility assistance for an average utility payment of $283. It is important to note that this figure is substantially higher than the $3.3 million tracked by the City of Knoxville (see p. 3), but that figure does not include utility payments made directly to the client or to residents who receive utility allocations. Social services agencies in the city had more than 60,000 touch points with clients to assist them with energy-related needs.

The data supports what is readily known: a large group of people in Knoxville is struggling to stay warm in the winter, keep comfortable in the summer and remain housed. It includes the most vulnerable members of the community — the elderly, the physically disabled, the mentally ill and low-income families with small children. The need is great for a more considerate plan for these Knoxville citizens and a more sustainable approach to energy assistance.

A number of organizations in Knoxville are working with clients on energy-related issues. They include nonprofits, churches, government agencies and individual supporters from the community. They provide assistance in the form of utility payments, as well as home repair and weatherization. They provide emergency services for those who are on the verge of the losing their homes or have lost their homes because they were unable to pay bills.

Issues

These charitable organizations are caring, committed and diligent in their support of this community. There is some collaboration between agencies to get things done, such as when making payments from source organizations to recipients and referring or engaging with other agencies for required services. However, there is not currently a strategic, proactive plan to communicate and coordinate services between agencies or develop more holistic client support. This leads to the duplication of activities and a less-than-efficient use of resources — people, time and funding — within all agencies.

Examples include the following:

- Client intake and needs assessment is duplicated as it is done separately by all agencies.
- City departments seem to run autonomously from each other.

The Smarter Cities Challenge team found a positive and strong desire by all stakeholders to participate in a coordinated effort to address the needs of the vulnerable community. There are emerging efforts to bring together agencies that are engaged in specific focus areas, such as the Sustainability Advisory Board or the Compassion Coalition. These are critical building blocks, but a citywide emphasis is now required.

Impact

Recent reports from the Center for Housing Policy (see Appendix D) categorize the impact of affordable housing, including energy efficiency, on the local economy as below:

Family impact

When housing is affordable, low- and moderate-income families can put nutritious food on the table, receive necessary medical care and access reliable daycare for their children. Research has shown that the stability of an affordable mortgage or rent can have profound effects on childhood development and school performance and can improve health outcomes for families and individuals (see Center for Housing Policy reports and articles, Appendix D).

Community impact
The development of affordable housing increases spending and employment in the local economy acts as an important source of revenue for local government and reduces the likelihood of foreclosure along with its associated costs. Without a sufficient supply of affordable housing, employers and entire regional economies can be at a competitive disadvantage because they have difficulty attracting and retaining workers. For each 100-unit apartment complex built, 80 jobs are created by the direct and indirect impact of new construction; 42 jobs are created as a result of locally earned wages; and 30 jobs are created by the spending of new homeowners in the community.

Energy impact
The United States Department of Energy (2010) estimates that low-income families who participate in the federal Weatherization Assistance Program reduce their energy expenditure by an average of $437 per year (see Weatherization and Intergovernmental Program Appendix D). These savings can, in turn, fuel local economic growth; money saved from lower energy bills can be plowed by new homeowners into housing-related services.

A national issue

Knoxville is not alone in facing these challenges. Mayor Bloomberg said of New York:

"A growing population, aging infrastructure, a changing climate and an evolving economy posed challenges to our city's success and quality of life. But we recognized that we will determine our own future by how we respond to and shape these changes with our own actions."

During his eight-year tenure as Mayor of the Metropolitan Government of Nashville and Davidson County, Tennessee (1999 - 2007), Bill Purcell saw unprecedented economic expansion in the city, including the development and preservation of more than 26,000 affordable housing units (see Appendix D).

Moving forward

Knoxville faces a number of challenges that prevent it from moving forward. They include the following:

- Multiple sources of data, each with its own rules and definitions
- A lack of integrated data leading to limited fact-based decision making
- Many voices with no common vision
- Inadequate funding sources that are disparate and not always easy to access
- A lack of collaboration across parties, policymakers, citizens, higher education institutions, businesses and investors
- Limited weatherization and efficiency education resources that are not well funded, coordinated or actively promoted
- Many low-income housing landlords not actively weatherizing properties because of a lack of regulation, incentives and/or interest in the issue

In applying for an IBM Smarter Cities Challenge grant, Madeline Rogero, Mayor of Knoxville, and her senior leadership team wished to:

Utilize the skills and expertise of a talented IBM team to brainstorm a way to track and measure emergency energy services and to recommend the best way to systematically improve Knoxville's older housing stock accordingly.

The City asked the Smarter Cities Challenge team to craft a new systematic approach to an old problem; one that will generate better data and give City leaders tools to optimize their use of limited resources, make better decisions and best target their interventions.

The global team's deep expertise across a diverse set of disciplines enabled it to approach these challenges in new and innovative ways. Bringing an alternative view to analyzing problems and developing solutions, the team worked with many different stakeholders to gain required buy-in and momentum.

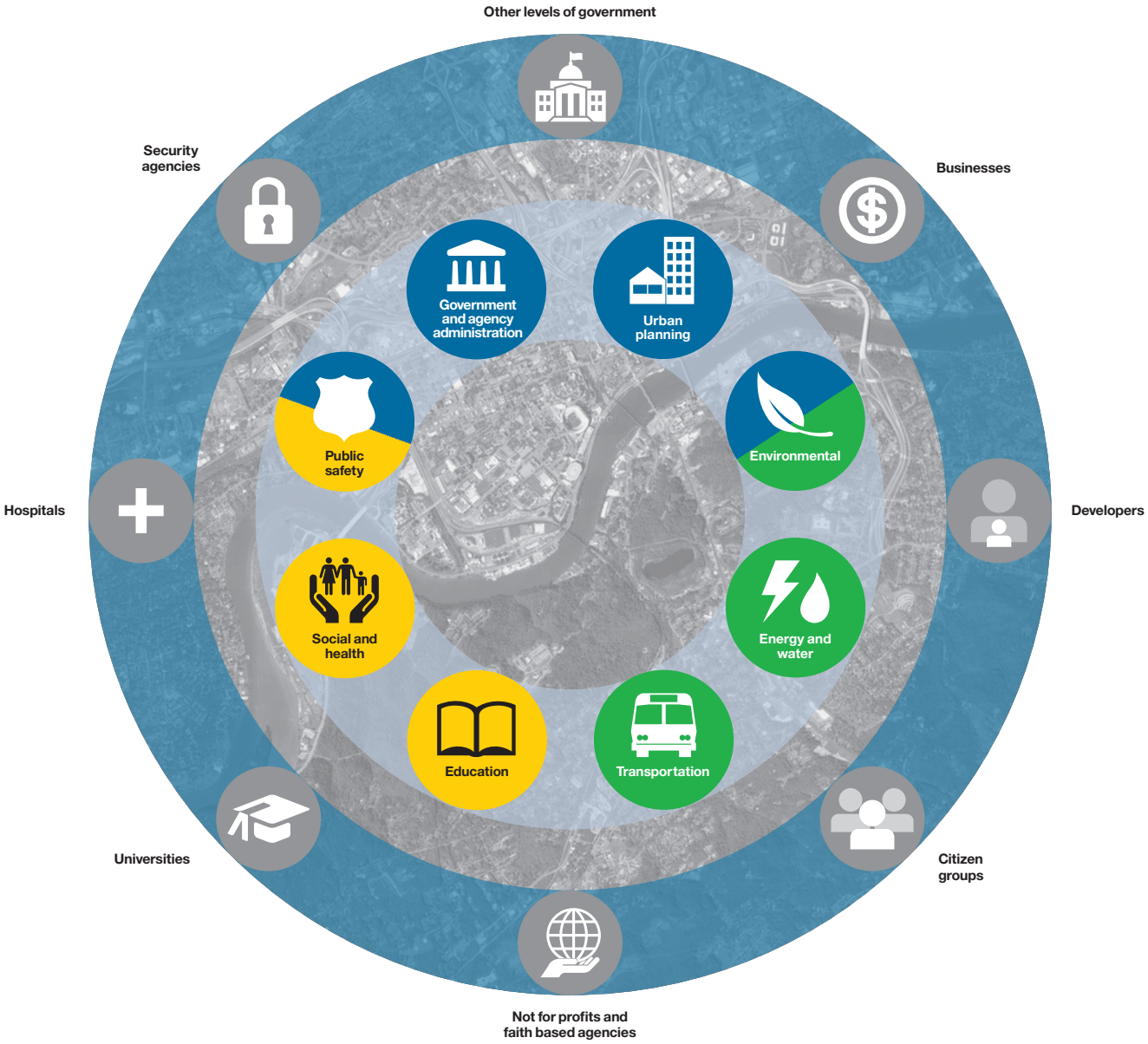
3. Findings, context and roadmap

A. Findings and context

For three weeks, the Smarter Cities Challenge team worked together to understand the issues and assess the options and then deliver recommendations and a roadmap to the City. The team conducted more than 50 formal interviews with 29 stakeholder groups representing the public, private and education sectors. Combining interview insights with an assessment of a model for a successful Smarter City (Figure 2), energy efficiency and best practice, the team developed the following findings:

- **Culture:** Cultural norms could be a barrier to the community working together.
- **Communication/coordination:** Areas for improvement exist, but there is a strong desire by all stakeholders to address this.
- **Data:** Data exists that could prove the business case for weatherization and link funding to needs.
- **Weatherization and education models and efforts:** There is an opportunity to leverage models used by other cities; local educational resources are interested in participating and collaborating more proactively.
- **Funding sources:** Resources are inadequate, disparate and lack ease of accessibility.
- **Landlord regulations and incentives:** Many organizations see the need to work more closely with landlords in an effort to increase their accountability and involvement.

The team used these findings and its knowledge about the capabilities of a Smarter City to develop a roadmap of recommendations.



Planning and management

Design and implement a city plan to realize full potential for citizens and businesses while efficiently running daily operations

Human

Deliver efficient funadmental services that make a city desirable for citizens

Infrastructure

Provide effective services that support the economic, social and health needs of citizens

Figure 2:
Model of a successful smarter city

B. Roadmap of recommendations

The team developed five recommendations for creating a systematic approach to connecting energy consumption data with valuable weatherization resources that substantially benefit the community. These recommendations work together, building off the successes of each other.

1. **Develop one voice around a shared vision:** Improve coordination and communication
2. **Harness the data:** Enable fact-based decision making
3. **Educate the community:** Develop and implement end-to-end education campaigns
4. **Fund the program:** Create a sustainable and perpetual funding system
5. **Engage landlords:** Incentivize, collaborate with and regulate property owners

The roadmap defines the key milestones required to implement the recommendations over a year. It is segmented by three horizons:

- **Horizon 1** — set the stage: Immediate through six months
- **Horizon 2** — implement the change: 6 - 12 months
- **Horizon 3** — deliver the vision: 12 months and beyond

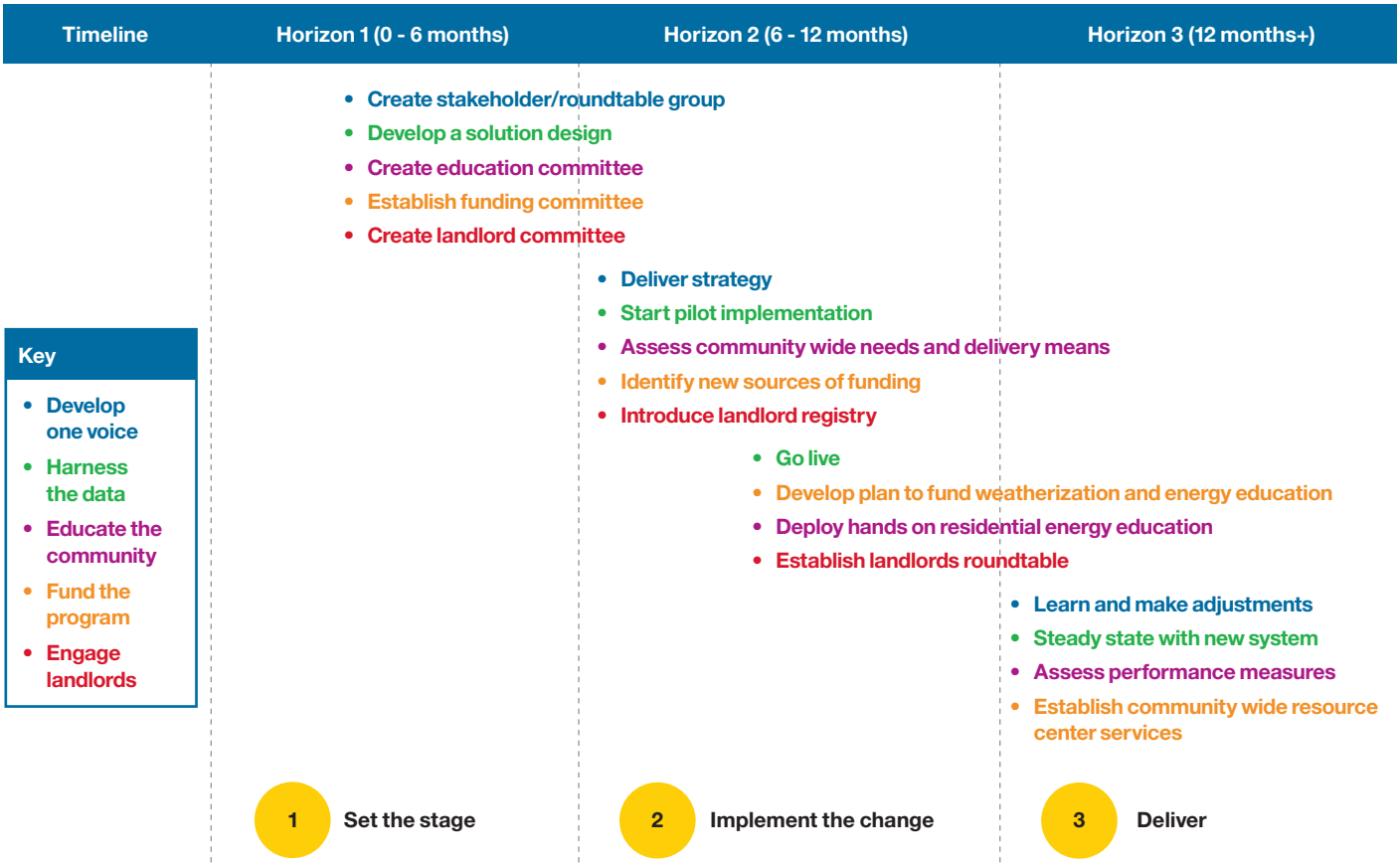


Figure 3:
Roadmap for recommendations

Underlying the roadmap is a set of critical strategic and tactical success factors, which are common for any large, complex implementation. They raise the probability of success as well as enhance commitment and collaboration among stakeholders. The City should focus on ownership, empowerment and accountability.

Strategic success factors	Tactical success factors
• Make leadership visible • Build the coalition • Maintain a joint definition of success • Recognize the culture shift • Develop a system to engage and communicate	• Assign a team of people with the appropriate skills, knowledge and time • Use standard project management methods • Identify appropriate benchmarks and define key performance indicators • Celebrate successes

Table 2:
Strategic and tactical success factors

4. Recommendations

Recommendation 1: Develop one voice around a shared vision

The City should develop a strategic focus and improve its coordination of resources and communications across agencies by developing a citywide campaign to build a "strong Knoxville". This should create a shared vision of economic development and improved family life that addresses affordable housing, energy efficiency and clean air.

The City's immediate requirement is to reduce the amount spent on utility assistance payments and move toward more sustainable programs for weatherization, home repairs and energy retrofits.

The City needs a shared vision promoted by a citywide campaign to build a strong Knoxville. The campaign must be inclusive; represent the community's agenda; and address the target areas of economic development, affordable housing, energy efficiency and clean air.

The campaign will serve as a rallying point to get the City excited and engaged about this opportunity to improve quality of life for residents, and it will provide a platform for enhanced economic development.

"We need a more holistic view of the client."

"We should provide long-term solutions, not 'band aids' for our clients."

"We want to work better together across agencies to provide the necessary assistance for our clients."

"We're wasting time and using resources inappropriately by not using the tools available."

Quotes from stakeholder interviews

1. Assemble a council of stakeholders

The Mayor should work with the Knoxville Office of Sustainability and the Knoxville Chamber of Commerce to assemble a council of stakeholders comprising elected officials, business leaders, representatives from nonprofit agencies and churches, environmental and community advocates, labor leaders, planners and real estate developers.

Proposed members include the following stakeholders:

- Mayor Madeline Rogero
    1. Susanna Sutherland, Office of Sustainability
    2. Rebecca Wade, Community Development Department
    3. Michael Dunthorn, City Homelessness Roundtable
- Knoxville Chamber of Commerce
- Public relations (PR) firm
- Congressman, John J. Duncan
- Mintha Roach, KUB
- Bob Balzar, Tennessee Valley Authority (TVA), Energy Efficiency and Demand Response
- Barbara Kelly, Community Action Committee (CAC)
- Joyce Floyd, Knoxville Community Development Corporation
- Mary Wilson, Community and Planning Director, Department of Housing and Urban Development (HUD)
- Marie Alcorn or Ben Landers, United Way, Knoxville
- Ken Block, Knox Housing Partnership (KHP)
- David Patterson, UT Knoxville
- Jim Green, Southern Alliance for Clean Energy
- Joe Newman, Advantage Property Management
- Phyllis Nichols, Knoxville Area Urban League
- Gina Whitmore, Compassion Coalition
- Teri Brahams, Pellissippi State College
- Hank Helton, Pathway Lending
- Stan Johnson, Socially Equal Energy Efficient Development (SEEED)
- Other philanthropists and representatives from foundations

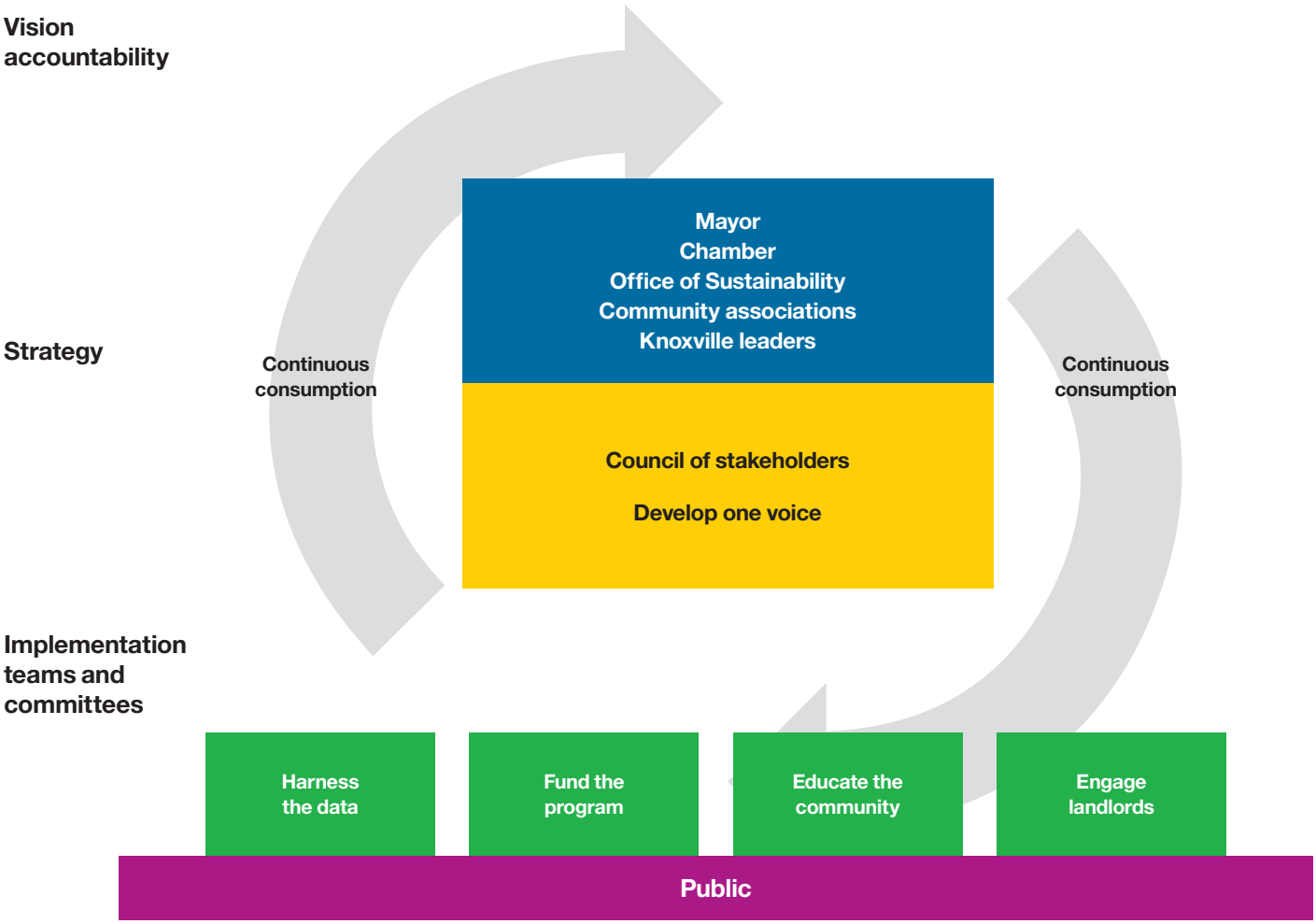


Figure 4:
Governance structure

Council of stakeholders
This group will lead the definition of the shared vision for a strong Knoxville and provide leadership in the community for the campaign. It will recommend leaders and participants for the implementation teams. It should represent a cross section of businesses, nonprofits, churches, government and other entities. The council of stakeholders will recruit a PR firm (or leverage the Chamber of Commerce) with experience in promoting City initiatives around affordable housing, energy efficiency and clean air.

Mayor and Office of Sustainability
The Mayor will play a critical role in communicating key messages to the public and ensuring the commitment and participation of City government departments. The Office of Sustainability will provide leadership for the planning and execution.

The Knoxville Chamber of Commerce/PR firm
The Chamber of Commerce sets measurable objectives for the City in the campaign to drive economic prosperity, including new business development for existing clients and attracting new businesses from other areas. The Chamber or a PR firm will develop a citywide campaign to communicate the shared vision for a strong Knoxville in order to rally the City and get the public engaged.

The public
The engagement, buy-in and support of the public are critical to the success of this effort. It is imperative that the public is engaged and informed through town hall meetings, online information and other forms of communication. Citizens' support as volunteers, financial contributors and advocates is key.

2. Form implementation committees and teams

The council of stakeholders should work with the Office of Sustainability to form implementation committees and teams to address the specific areas of data, funding, education and landlords.

Data committee
The data committee will consist of two teams — one to lead the technical development of a system of systems and one to lead the collection of data.

1. **Development of system of systems:** The Social Work Office of Research and Public Service (SWORPS) at the University of Tennessee will be responsible for setting up use cases and identifying relevant data sources. It will work with the council of stakeholders to determine what data is needed to provide a comprehensive view of the problem and solution. The University of Tennessee will host the system of systems and lead its implementation. The reasons to engage SWORPS include the following:
   - It is an independent nonprofit organization.
   - It has the technical expertise to lead the system of systems implementation.
   - It has extensive experience in creating and managing data warehouses.

2. **Collection of data:** This team will need to set up a new database to host data on weatherization and education and to mobilize all stakeholders to use existing and new databases. This will provide a complete view of assistance given to citizens. The team will need to manage stakeholder training and provide any hands-on help required.

The data committee should include people who have knowledge and/or access to the various data sources and information regarding utility bill assistance, including people from the following organizations:
- KUB
- CAC
- University of Tennessee, Knoxville Homeless Management Information Systems (HMIS)
- Knoxville's Community Development Corporation (KCDC)
- Compassion Coalition

The data committee may also work with volunteer groups for data entry and data collection.

Education committee
The education committee will drive a coordinated effort to bring together existing valuable energy education resources and content, as well as engage new potential partners, such as local private corporations and educational institutions, that can play an active part in educating the community.

The City may choose to appoint a leader or coleaders with experience and passion for energy education. Leaders from CAC and KHP are viable options to chair the committee. The primary role of the leader(s) will be to gather critical committee participants on a regular basis in order to coordinate their efforts and ensure effective implementation of Recommendation 3. They will establish clear goals and key performance indicators (KPIs). Critical participants on this committee might include the following:
- CAC
- KUB (Project Help)
- KHP
- Pellissippi State Community College
- Technical/vocational Schools
- SEEED
- Compassion Coalition
- Volunteer Ministry Center (VMC)

Funding committee
This committee will identify the funding required to meet the City's near-term energy efficiency goals and identify creative ways to garner it. The committee will gain the support of powerful local leaders to act as representatives and champions to lead the fight for more energy investment and support. In the long term, the Mayor and the Office of Sustainability must determine the sustainable funding model required for its initiatives and investments.

The goal of this committee will be to create a sustainable and perpetual funding system that addresses all areas of energy efficient housing for Knoxville, leveraging one of the city's greatest strengths: its caring and giving culture. This culture was reflected in each person the Smarter Cities Challenge team interviewed as they expressed the urgency of finding a long-term solution to energy efficiency needs and their commitment to work together to find it. This committee might include representatives from the following organizations:
- Tennessee Valley Smart Energy Communities program
- KUB
- Banks
- CAC
- KCDC
- University of Tennessee, Knoxville HMIS
- Compassion Coalition

Landlord committee
This committee will engage landlords and community associations in regular meetings on issues and solutions related to blighted or at-risk properties.

Asking community associations to identify areas for improvement in their neighborhood has proved effective in Memphis, Tennessee, and again in Portland, Oregon. Asking tenants to identify problems is also a proven method of solving issues. The City of Asheville, North Carolina, provides prospective tenants with a checklist for deficiencies that they can discuss with, and get agreement from, the landlord to repair. They are encouraged to file these documents with the City, in effect registering the landlord and his commitment. Louisville, Kentucky, ran an open public forum called "The Outcome", which asked attendees to brainstorm solutions around how to deal with vacant and blighted properties. It brought issues to the forefront and gave the City a chance to prioritize options based on public feedback.

3. Develop and execute a community agenda

The City should work with the council of stakeholders to develop a community agenda setting out the findings and goals of the initiative. This should outline a plan for addressing the immediate need of reducing the amount of money spent on utility assistance and the transition to sustainable services.

1. Engage the data committee to define and collect the data needed to get a comprehensive and accurate picture of the need, which should include the following:
   - How much was spent in utility assistance payments in 2012-2013? What were the sources of funding? How many clients were supported? Include demographic information (income, employment).
   - How many homes were weatherized in 2012? Gather data on energy efficiency improvements since weatherization. What kind of energy education was provided?
   - How many and where are the homes that need weatherization and energy efficiency programs?
   - Assess income and opportunity for workforce development for those needing utility assistance.
   - What impact does "fuel poverty" and the lack of affordable housing have on residents and the opportunity for economic development?
   - Public survey to understand need and priorities.
2. Engage the Mayor, the Chamber of Commerce/PR firm and the council of stakeholders to develop messaging with which to share the vision with the public, based on supporting data from the data committee.
3. Work with implementation teams to define an execution plan, explaining how the City will reach its goals, including the following:
   - Funding committee to determine how available funding and programs could support this effort
   - Education committee to develop education plan
   - Landlord committee to develop plan for engagement
   - Data team to use system of systems to track/report on progress
4. Set measurable targets and goals for community agenda based on input from implementation teams
5. Execute the plan
6. Track and report to the public on status, successes and next steps

Recommendation 1: Develop one voice around a shared vision

The City should develop a strategic focus and improve coordination of resources and communications across agencies by developing a citywide campaign for a "strong Knoxville". This should create a shared vision of economic development and improved family life that addresses affordable housing, energy efficiency and clean air.

Scope and expected outcomes

Scope
Reduce utility bill assistance payments and move to more sustainable programs. Build a strong Knoxville that provides affordable, efficient housing through weatherization, energy efficiency education and home repairs.

1. Assemble a council of stakeholders
2. Form implementation committees and teams: data, education, funding, landlords
3. Develop and execute a community agenda:
   - Assess current environment of utility assistance payments
   - Develop messaging and communicate community agenda
   - Develop execution plan
   - Define indicators and set targets
   - Execute
   - Track and report progress

Expected outcomes
- More efficient use of resources, including people, funding and other assets for energy efficiency
- Reduction of utility bill assistance payments
- Improved energy efficiency of existing house stock
- More holistic services to support clients in need
- Tighter interlock between stakeholders for client services
- Increase of new development and renovations of existing house stock for affordable housing
- New opportunities for business development from existing and external sources

Cost of inaction
- **Families:** Families that are unable to pay energy bills can end up homeless; family life is disrupted and children can experience poor performance at school. They often have less access to healthcare services and eat less nutritious food.
- **Communities:** Increase in foreclosure and/or blighted properties; increase in homelessness and vagrancy.
- **Funding:** Continued use of funds for utility assistance payment — the band aid approach

Recommendation 1: Develop one voice around a shared vision (continued)	
Proposed owner and stakeholders	**Suggested resources needed**
Owner: City, Chamber of Commerce **Stakeholders:** Council of stakeholders (see p. 13)	• PR firm (could leverage Chamber of Commerce) • Funding for marketing and advertising **Cost estimate:** Medium — potential cost for PR firm and related marketing and advertising
Dependencies	**Key milestones, activities and timeframe**
Leadership and support from the council of stakeholders	**Horizon 1: 0 - 6 months** • Assemble a council of stakeholders • Validate and form implementation committees • Define roles and responsibilities • Define operating guidelines • Set mission and priorities **Horizon 2: 6 - 12 months** • Determine whether to engage PR firm • Develop community agenda and execution plan • Define indicators and measurements • Begin execution **Horizon 3: 12+ months** • Continue with plan execution • Monitor and track results
Priority	
High	

Recommendation 2: Harness the data

The City should build a system of systems to support coordination and collaboration among agencies that help people who cannot pay utility bills and offer advice and resources for reducing energy use.

A plethora of organizations currently exist with the aim of providing utility bill assistance, weatherization services and energy education for low-income citizens and families. The organizations deliver assistance through various channels: in the home, over the phone and online. They may be self-funded or supported by local government, community agencies or the faith community. But Knoxville citizens may not be aware of their presence; some are not even known to one other.

A few IT systems exist that provide partial information, for example, about emergency utility funds paid to citizens. However, the information captured is incomplete because not all agencies contribute to the systems. Other information, such as whether or not a house is already weatherized, can only be obtained by making phone calls. The absence of a complete and integrated data system results in large costs for citizens seeking assistance, agencies assessing the legitimacy of requests and agencies seeking to use their resources effectively.

A tool that systematically captures and integrates all information about where and how available resources are spent will allow for the following:

- Fact-based decision making
- Deeper program and budget analysis and evaluation
- Outcome-based, smarter decisions

As Table 3 shows, this will benefit all stakeholders.

Task	Current way of performing the task	Implication of performing task without a system of systems	Benefit of system of systems	Beneficiary
Identify the programs an individual in need of utility support is eligible to apply for	Agencies advise individuals based on the information they acquired about funding programs	Agencies and volunteers need to stay continuously informed about funding programs and changes, which is time consuming Information about new programs is often passed to the client only after the application deadline has passed	Automatic and instant retrieval of all programs an individual can apply for based on personal data provided	Citizens in need of emergency utility support Citizens eligible for weatherization funding Agencies
Determine legitimacy of client's request	Log-in to different systems is required to retrieve information about the history of client's requests No holistic view of weatherization of the client's housing nor the energy efficiency education the client received	Time consuming Inadequate decision making due to missing information	Automatically provides a holistic view about previous client requests, actions taken and effect (for example, impact of energy efficiency education on client's utility bill)	Agencies
Determine impact and performance of education and weatherization	Information about selected houses/clients can be retrieved by calling relevant agencies For most houses/clients no such information is available	Difficulty in making a business case for weatherization Duplication of education efforts	Automatically extracts all relevant information for making a business case	Agencies Policymakers KUB Tenants
Identify houses and neighborhoods that receive the highest amount of emergency utility funds	Information is not retrievable	Inadequate use of weatherization (assessment) resources	Automatically identifies neighborhoods that could benefit most from weatherization and education Cuts down travel time of auditors/ engineers by simultaneously assessing/weatherizing nearby houses	Agencies

Table 3:
Benefits of system of systems

The City should integrate the following types of data into the system of systems:

Type of data	Source/Owner	Data captured?
Emergency utility funds paid	KUB, Knoxville HMIS, Charity Check	Yes*
Reasons for accepting/rejecting requests for emergency utility funds	Charity Check	Yes*
Weatherization performed	Community College, CAC	No
Education performed	Energy Education Committee	No
Funding programs	Office of Sustainability	No

* Data of agencies that do not provide information to the stated sources are not captured

Table 4:
Data types for system of systems

KUB, Knoxville HMIS and Charity Check already provide easy access to data about individual clients who have given permission. The data should be queried not only for information about single clients but also for information about homes whose residents rely most on emergency utility funds. This requires simultaneous access to sets of client records for comparison and evaluation.

Data about weatherization and education should be captured in a database in order to avoid duplication of efforts; enable the City to evaluate outcomes to support future decision processes; and provide timely access about funding programs and updates. Agencies holding data about individual clients could retrieve a list of programs for which the client is eligible.

The system of systems represents a collaborative effort to enable fact-based decision making. For this to be realized, the council of stakeholders (see Recommendation 1) must be put in place, available data sources must be leveraged and new data sources must be added.

The organization responsible for the data (owner) must identify and maintain the master data source with its associated security and privacy policy. Each owner must then commit to data sharing, quality and maintenance, immediately addressing situations that can exacerbate information management tensions and stymie effective action. As the owner of the system of systems, SWORPS must guarantee to data owners that it adheres to the agreed treatment of confidential information. As agencies begin to share knowledge and information, they will be empowered to become more innovative.

Based on solution architectures that have been designed and successfully deployed elsewhere to address similar requirements, the Smarter Cities Challenge team recommends the architecture depicted in Figure 5. Using the reference architecture has the following benefits:

- **Separation of concerns:** Permits the system designer to change one component with zero to minimal impact on other components.
- **Cost reduction:** Development costs are reduced as the solution architecture does not need to start from scratch.
- **Improved deployment speed:** The descriptions associated with layers, building blocks and components of the reference architecture outline key principles, architecture decisions, deployment scenarios and guidance.

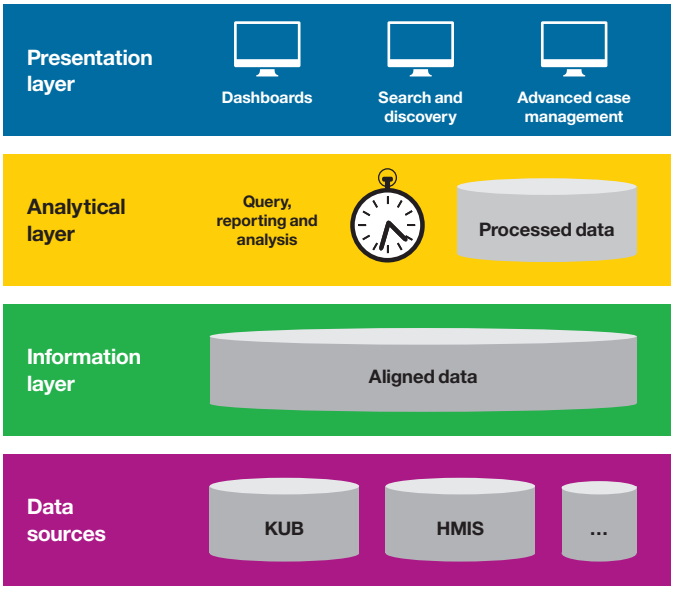


Figure 5:
Suggested architecture for system of systems

There are three major layers in the architectural design:

1. **Presentation layer:** Presents and visualizes analysis results. Capabilities can be local (website or portal) or remotely integrated in external websites. Functionality includes case management, providing a comprehensive view of the case.
2. **Analytical layer:** Implements the analytic capabilities interacting with the information layer to query, dynamically aggregate and analyze the data. Report generation and analysis are part of this layer. It can answer questions like: "Which neighborhood receives the highest amount of emergency utility funds?"
3. **Information layer:** Hosts the data warehouse holding data from the source systems, which includes the following:
   - Transformed to adapt the data to the system of systems data model
   - Extracted, masked or aggregated (in space and/or in time) to comply with attached privacy and confidentiality policies
   - Enriched with additional information available in the system of systems

In summary, the system of systems would integrate all data sources that are relevant for efficient collaboration and coordination among different stakeholders and for fact-based decision making and analysis. This holistic view of information would also address new research questions. The team therefore suggests applying to the National Science Foundation for funding. Other sources of funding are discussed in Recommendation 4.

Recommendation 2: Harness the data

The City should build a system of systems to support coordination and collaboration among agencies that help people who cannot pay utility bills and offer advice and resources for reducing energy use.

Scope and expected outcomes

Scope
- Set up a new database for education and weatherization related data
- Collect all data
- Implement a system of systems

Expected outcomes
- Efficient collaboration among different stakeholders
- Increased efficiency of assessing client's requests given the holistic view the tool provides
- Resources for energy efficiency improvements reach those who need them most

Cost of inaction
There will continue to be a duplication of efforts among different stakeholders and a suboptimal use of resources targeted at preventing high utility bills.

Proposed owner and stakeholders

Owner: University of Tennessee — SWORPS

Stakeholders:
- KUB
- CAC
- Compassion Coalition

Suggested resources needed

- Technical expertise and resources and an implementation plan to build the system of systems
- Funding to implement and maintain the system of systems
- Resources to enter all data into the corresponding databases

Cost estimate:
Medium (project funding, software licensing, master data sources ownership and committed funding)

Dependencies

- Recommendation 3
- Recommendation 5
- Implementation team in place
- Data collection team in place
- Data access approval, if required

Key milestones, activities and timeframe

Horizon 1: 0 - 6 months
- **Immediate:** Kick off implementation and data collection teams; hold interdisciplinary meeting constituted by owner and stakeholders to outline a plan of action and discuss key themes
- **3 months:** Select master data sources and define agreement with owner
- **3 months:** Develop solution design for system of systems
- **3 months:** Collect data into new databases

Horizon 2: 6 - 12 months
- **7 months:** Initiate pilot
- **10 months:** Implement pilot changes and go live
- **12 months:** Steady state production

Horizon 3: 12+ months
- Expand to "recommender" system that proactively informs eligible citizens about new funding programs and weatherization agencies about citizens in need
- Evaluate alternative (but integrated) sourcing arrangements
- Advanced visual presentation of geospatial information

Priority

High

Recommendation 3: Educate the community

The City should develop and implement an end-to-end education campaign using multiple delivery methods to address the needs of different audiences.

Education enables behavior change. The citizens of Knoxville would benefit deeply from an education campaign around basic energy consumption, home weatherization and repair and general understanding of energy as a societal and local issue. Ultimately, an educated community will make Knoxville "energy smart" and less dependent on emergency utility funding.

Cities that have successfully tackled similar issues have taken a broad community education approach. For example, as a part of its campaign, Nashville effectively engaged its faith-based community. Knoxville has a tremendous opportunity to take a similar approach by nurturing the impressive efforts of its Compassion Coalition.

Weatherization and energy efficiency education content and resources exist through many different channels, but education is typically provided reactively due to lack of funding, promotion and coordination. There are promising opportunities to pull in new education planning and delivery partners, including volunteers from Pellissippi State Community College, local vocational institutions and nonprofit workforce development apprenticeships.

An effective education campaign will require the appointment of an education committee, as described in Recommendation 1, that will connect the disparate providers, engage new ones and ensure strong collaboration that benefits all constituents to the greatest degree.

The education campaign should be segmented into two primary audiences: low-income residents and the wider Knoxville community.

1. Low-income residents

Generally, education for the low-income population struggling to pay utility bills should be delivered in person to ensure full understanding. Many low-income citizens don't have access to the Internet and don't take the time to read energy savings tips on their bills, so a personalized approach would be more effective.

"Education needs to be easily accessible and offered at different times and different locations and for different levels of understanding."

"We need more than education solely for the consumer but also community-wide education so everyone knows how they can best help and what resources exist."

Quotes from stakeholder interviews

Education could be delivered through workshops, one-on-one sessions, in-home appointments and agency or community center classes. Ideally, content would include a comprehensive view of the basics of interpreting a utility bill; DIY tips and best practices, including simple energy conservation tips and minor weatherization home repairs; and availability of low-cost weatherization programs and how to apply.

Short term, the CAC and KCDC should advise where and how to prioritize education. Long term, the systems database referenced in Recommendation 2 will supply this information.

The education committee should do the following to promote the campaign:

1. Actively engage Pellissippi State Community College and local technical vocational schools that provide training in energy efficiency and weatherization. While the Smarter Cities Challenge team did not interview technical colleges, Pellissippi State indicated a willingness to explore using internships, as well as its new service learning component, to provide student volunteers to help educate and assess the homes of low-income residents. This would be done in partnership with the CAC and KCDC. Pellissippi State could also help identify appropriate vocational colleges for similar partnerships. The team recommends a consistent approach that could be modeled after the energy audit toolkit created for volunteers by the Corporation for National Community Service (see Appendix E).
2. Partner with SEEED to identify and provide trained volunteers that can go directly into the community to educate, assess and potentially weatherize homes. SEEED has developed an innovative approach to reaching constituents by training young adults from low-income neighborhoods in their sustainability apprenticeship program and then proactively driving a door-to-door campaign to educate and assess neighborhood homes. This type of approach should be expanded — not only to solve the long-term energy efficiency challenge but also to support workforce development in Knoxville. SEEED is willing to be an active partner in this effort, including during the planning phase.
3. Ensure KUB is an active and visible partner in the education campaign. KUB has valuable education content and people trained in energy efficiency that could attend public meetings and hold "train the trainer" sessions for new volunteers. Project Help is an independent volunteer advisory board. A number of KUB employees serve in this function regularly, depending on the audience.
4. Identify and engage corporate businesses, such as Home Depot, Lowes and ACE Hardware, that could help facilitate educational workshops at CAC centers and/or other appropriate forums. ACE Hardware has previously cohosted free consumer workshops in Colorado, and claims, "the tips we talk about can help homeowners cut annual energy consumption by as much as 50%" (see Appendix E). And Lowes has a history of serving in communities of need, as well as a foundation that supports community improvement, as one of its two primary philanthropic focus areas (see Appendix E).

2. The wider Knoxville community

Engaging and educating the entire community is critical to the success of this initiative. The broader community, including faith-based and corporate organizations, needs to care about this issue. Once they understand that the quick-fix model of emergency bill payment is only perpetuating the cycle of poverty, they might become more engaged in addressing the root cause of the problem for long-term benefit.

As mentioned above, Nashville has run a very successful community education campaign, which ultimately led to a reduction in emergency bill assistance. Key components to Nashville's campaign included the following:

- Using tactics such as workshops, fliers and adverts on public transportation
- Focusing education on basic energy efficiency tips and how to apply for weatherization services
- Building a strong network of nonprofit agencies to generate funding
- Leveraging Tying Nashville Together, a coalition of churches very similar to Knoxville's Compassion Coalition
- Ensuring consistent and constant messaging that was driven by the Mayor's office but ultimately looked and felt like a community effort

The education committee should take these actions:

1. Build on existing relationships with the Compassion Coalition and the VMC to identify ways to reach and educate beyond the 30% of Knoxville churches partnering with the Coalition today, including how to engage the entire interdenominational faith community. They may already have examples of this but could also reach out to Tying Nashville Together for advice.
2. Develop and implement education aimed at landlords, establishing a program that helps reduce tenancy turnover and improves the overall value and quality of properties. A great example is the City of Portland's Landlord Training Program (see Appendix E). Although weatherization is not the focus of Portland's training, it can and certainly should be included in Knoxville's. The energy education committee should adapt Portland's guidance on how landlords can choose better tenants and maintain their property to improve neighborhood standards and reduce the risk of crime. City of Portland surveys "Indicate that over 90% of landlords who attend the training make beneficial changes in the way they manage their property as a result" (Source: City of Portland's Landlord Training Program, Appendix E). If Knoxville landlords see the benefit, both to themselves and the greater community, they are more likely to participate.
3. Pursue K-12 energy education to prepare young adults who will soon be running their own homes and prime them to advise their parents on good energy practices. The State of Wisconsin created a best-in-class K-12 Energy Education Program, known as KEEP (see Appendix E). The website is thorough and provides excellent examples of the education program, including a section dedicated to home energy. In the Smarter Cities Challenge team's interview, United Way suggested it could provide appropriate funding for this.
4. Further explore KHP's proposal for a community energy and environmental education center. The proposal identifies the education center as residing in the Park City neighborhood; the energy education committee should carefully time the campaign to ensure there is participation beyond Park City residents for an adequate return on investment.
5. Ensure a steady drumbeat of clear and consistent messaging from the Mayor. For example, the City could identify the 10 largest civic issue gatherings in Knoxville each year and ensure energy efficiency and its relationship to homelessness, health and safety is on the agenda at every meeting. It should explore a consulting opportunity with a marketing or PR firm to aid in the formulation and/or delivery of a community-wide program, as discussed in Recommendation 1.

Recommendation 3: Educate the community

The City should develop and implement an end-to-end education campaign that uses multiple delivery methods to address the needs of different audiences.

Scope and expected outcomes

Scope

Energy education for low-income residents:

- Engage Pellissippi State, vocational schools and apprentice programs, such as SEEED, to provide volunteer resources
- Use SEEED model for door-to-door education in low-income neighborhoods
- Leverage KUB staff to lead workshops and "train the trainer" programs for appropriate agencies
- Identify corporate sponsors to partner with CAC on workshop delivery

Community-wide education campaign:

- Partner with Compassion Coalition and VMC to engage/educate faith community
- Develop and implement landlord education
- Pursue K-12 education opportunities
- Assess KHP's community education center proposal
- Ensure steady messaging from Mayor/City
- Identify key performance indicators (KPIs) to assess progress and measure outcomes

Expected outcomes

- Increased awareness and use of weatherization programs, as well as self-assessment and in-home repair capability
- Increased awareness of and support from broader community
- Improved reputation and visibility of KUB as helping residents
- Long-term improved housing stock, lower energy use and reduced emergency payments

Cost of inaction

Education and awareness is the first step in changing behavior. Without it, utility bills will remain high, and many low-income residents will struggle to pay them.

Recommendation 3: Educate the community (continued)	
Proposed owner and stakeholders	**Suggested resources needed**
Owner: Office of Sustainability **Stakeholders:** • Knoxville residents • KUB • CAC, KCDC, KHP, SEEED and Compassion Coalition • Knoxville Academic Institutions • Select corporate partners, for example, Lowes • Knoxville churches • Knoxville landlords	• Funding/support for workshops, although if KUB and corporate partners agree, this could be minimal • United Way grant for K-12 education • Volunteers from educational institutions • Funding for community campaign **Cost estimate:** Medium to low if efforts are well coordinated and community is involved
Dependencies	**Key milestones, activities and timeframe**
• Committed and sustainable education committee • Community awareness campaign funding	**Immediate** Kick off education committee to coordinate stakeholder efforts and assess education tactics; publish set of KPIs **Horizon 1: 0 - 6 months** Assess and begin to deploy residential education tactics **Horizon 2: 6 - 12 months** Begin assessment of community education tactics **Horizon 3: 12+ months** Continue residential education and deploy community education tactics; assess against KPIs
Priority:	
High	

Recommendation 4: Fund the program

The City should create a sustainable and perpetual funding system that addresses all areas of energy efficient housing.

Knoxville needs funding and resources for weatherization, energy education and the development of its system of systems. The KCDC indicates that there are 500 public housing units and 183 Section 8 houses that need to be weatherized in the near term. The Knoxville Community Development Department Action Plan for 2010-2015 has a goal to make energy efficiency improvements to 200 housing units for low-income families. (See 2011 Knoxville Report CAPER001 in Appendix F for more detail.) In addition, there are thousands of houses owned by low-income families that require these services.

The Smarter Cities Challenge team's interviews revealed that a number of organizations are willing to provide funding and/or services for energy education and weatherization, while others are willing to shift their funding from utility bill assistance to sustainable solutions. However, because these organizations each work with targeted segments of the population and because there is no community plan for energy efficiency, no organization has full visibility of the community needs as a whole.

The Mayor, the KUB and the TVA should work together to lead a community-wide plan for energy efficiency. As described in Recommendation 1, a funding committee convened by the Mayor and led by the Office of Sustainability must be established to lead the fight for more energy investment and support.

Improving the current housing stock

Data exists that proves the economic value of energy efficiency measures for housing stock. The Smarter Cities Challenge team interviewed a number of stakeholders to determine what data could be measured to support this.

The KCDC claims that utilities rank second in its operating and maintenance costs. In 2006, it utilized HUD's Energy Performance Contracting program to invest $9 million in energy conversation measures in 3,700 public housing units. Initial estimates indicated it should expect 20% savings in electricity costs and a 19% savings in water costs. Actual savings have exceeded those estimates. In year one, utilities costs decreased by $80,000 (20%) and savings from freezing base consumption totaled $900,000. In years two through four, each produced more than $1 million in savings. In its latest Annual Savings Measurement and Verification Report: Year Four Year — July 1 2011 through June 30 2012, annual electric savings are stated as $262,788 (24%) and water savings as $804,850 (38.4%) totaling $1,067,638 in annual energy savings. See Appendix F for the full report.

Money gained from energy saving was spent on miscellaneous upgrades to other units, including additional efficiency measures. For example, recently acquired County Housing Authority units were upgraded, removing old inefficient sliding glass doors and installing energy efficient windows. These savings are also being used to upgrade from the existing 1.6 gallons per flush (GPF) toilets to new 1.2 GPF toilets. The largest and oldest property is in the process of receiving heating, ventilation and air conditioning, as well as kitchen and bathroom exhaust systems. Savings have also been used to cover gaps in ongoing operating costs for which HUD funding has been significantly reduced because of proration and sequestration. Being proactive on this front has enabled the KCDC to remain financially sound and avoid laying off staff as many other housing authorities have had to.

The KHP, a Community Housing Development Organization (CHDO), retrofitted 29 homes in the Park City neighborhood with energy efficiency measures. Data analysis revealed that for an average investment of $10,500 per home, annual utility bills decreased by 22%. See Appendix F for details.

This business case could be extended to all 500 houses in the Williams Creek at Park City neighborhood, for which Knoxville has utility billing data today. The KHP has produced a return on investment model for this data. This data would help the funding committee to target its efforts. See Appendix F for more information.

Given the proven economic benefit of energy efficiency measures for housing and the great need for them, the City of Knoxville should pilot a phased adoption of programs that move funding for utility bill assistance toward elevating the quality of housing stock, providing a long-term solution to reducing energy consumption.

"We can't continue to just manage poverty."

— Gina Whitmore, Compassion Coalition

The KHP developed the following five-year transition plan:

Use case	Action
Goal	• Move 5,000 homes from average Home Energy Rating System (HERS) score of 150 to 120.
Plan	• Year 1: $4 million for utility bill assistance; $1 million for weatherization. Then move $1 million per year for four more years from utility bill assistance to weatherization. • This funding would provide $3,000 per unit; landlords/homeowners would provide $6,000. Total of $9,000 over five-year period is the typical cost to move HERS score from 150 to 120. • Funding sources provide $1 for every $2 invested by landlords/low-income homeowners.
Results	• Utility bill savings of $550 per unit per year for 5,000 homes = savings of $2,750,000 per year or $13,750,000 per five years. • Grid use reduction of 25 million watts per five years.
Payment	• Qualified homeowners/landlords could pay for $6,000 in weatherization services on utility bills or to a lending agency providing a low-cost loan, applying savings of $2,750 over five years to loan, resulting in net cost of $3,250 to homeowner/landlord.
Funding	• Environmental Protection Agency (EPA) settlement funds will soon be available as part of the Tennessee Valley Smart Energy Communities program (see Appendix F for more information). • Community Development Block Grants. • The VMC, Compassion Coalition and other local charities. • The City of Knoxville/CAC should also investigate whether or not a waiver to use LIHEAP funds for this pilot program is possible.

Table 5:
Five-year plan for transitioning utility bill assistance to housing stock

KUB leadership

In its role on the funding committee, KUB should build on its strong partnership with the TVA as a means of providing funding for energy efficiency programs for the benefit of Knoxville agencies and citizens.

For example, the KUB should continue pursuing becoming the next pilot site for the TVA's new single engagement platform for residential customers (see p. 34 for more detail). The pilot program will launch this summer in Memphis and the TVA may make the program available to other Tennessee distributors following the pilot.

The KUB should seek to partner with the TVA to secure money for weatherization services under the Tennessee Valley Smart Energy Communities (Project A) program funded by an EPA settlement agreement. Extreme Energy Makeovers (Project B) will provide at least two communities of homes or residences located in different climate regions in the Tennessee Valley with cost-effective, deep-energy retrofits, maximizing the use of the energy reduction measures in the whole house. $20 million is available over a five-year period for qualifying communities. See Appendix F for more information.

The KUB should investigate models from other cities as benchmarks/best practice for funding energy efficiency programs to enhance its existing strategies. For example, the TVA is currently working with the MLGW on a pilot program called eSCORE based on TVA's single engagement platform. The City of Memphis is partnering with community organizations to fund the $150 eSCORE fee charged to residents, and it is also looking at community lending programs to help finance the energy efficiency improvements. June 2013 is the launch date for the MLGW eSCORE program.

Another example of best practice is MLGW's Project CARE, which was conceived in 1984 and has supported the Memphis community for 27 years. The program helps more than 120 customers in need each year. MLGW employees and other volunteers weatherize homes and build wheelchair ramps for elderly and low-income customers. More than 150 MLGW volunteers participate in Project CARE each year; MLGW departments often volunteer with the project for team-building events. In 2012, the first annual Race to CARE 5K Run/Walk raised $72,000 for Project CARE to assist 150 MLGW customers.

The KUB should consider channeling the funds and resources from its KUB Cares program into weatherization services rather than different community organizations each year.

Although the KUB does currently conduct community programs, the MLGW runs a number of other programs that the KUB could adopt to benefit the Knoxville community. Several are funded in part through the TVA or community partnerships. For more information, see MLGW Green Initiatives Annual Report 2011 in Appendix F.

Possible funding sources

The City should investigate the funding and support resources detailed in the table below.

Program	Source	Amount	Priority	Date due	Action needed	Owner
Bill Roundup Program*	KUB	$600,000 per year estimated	High	ASAP	Mayor Rogero contact Mintha Roach to discuss	KUB/City
Residential single engagement platform*	TVA	Varies by score	High	June 2013	Contact the TVA to become next pilot site	KUB
American Recovery and Reinvestment Act of 2009 (ARRA)	DOE; administered by the Tennessee Housing Development Agency (THDA)	$1.9M still remaining for TN	High	ASAP	Get the THDA to make date extension request to Bob Adams, DOE	City
Tennessee Valley Smart Energy Communities program*	TVA	$20M	High	ASAP	Contact the TVA for assessment	KUB
Community Development Block Grants (see Appendix F)	HUD	$1.4M	High	Ongoing	Formula-based funding	Community Development Department
Home Funds—Owner Occupied Housing (See Appendix F)	HUD	$800,000	High	Ongoing	Formula-based funding	Community Development Department
Grant writing	University of Tennessee	Varies	Medium	By request	Contact university research department	Office of Sustainability
Funding for Energy Education Programs, IT Equipment/Services and Grant Writing	United Way	Varies by grant	High	In time for 2014 budget cycle	Contact the United Way to discuss options, complete grant applications	Office of Sustainability
Organizations willing to move utility assistance funds to weatherization services	VMC, Compassion Coalition	Varies	Medium	In time for 2014 budget cycle	Contact the VMC and Compassion Coalition to discuss approach	Office of Sustainability
Energy Efficiency Program Advocacy Support	United Way	Resources	Low	Ongoing	Contact the United Way to discuss approach	Mayor/ Office of Sustainability
Weatherization Assistance Program (see Appendix F)	DOE funded; administered by the THDA	Varies by grant	Medium	Ongoing	Review website and contact the THDA/DOE for more information	Office of Sustainability
Energy Education	United Way, Pellissippi Community College, CAC, TVA, SEEED	Varies by grant	Medium	Ongoing	Discuss capabilities with each organization, submit proposal	Office of Sustainability
Environmental	JBP Foundation (see Appendix F)	Various by priority and impact for change	Low	Ongoing	Contact JBP Foundation	Office of Sustainability

Table 6:
Sources of funding and support for weatherization and energy education

* See detailed program descriptions on page 34

Residential single engagement platform

This new program provides sustainable funding for homeowners and landlords to make energy efficiency improvements to their homes based on repeatable scoring. It helps rental tenants, homeowners and prospective homeowners to understand true utility costs and make better choices.

It provides a picture of the structure of the home and how residents interact with it. An in-home evaluation done by a Business Performance Institute (BPI)-certified auditor or an online evaluation done by the homeowner/landlord/tenant generates a score between 0 and 10, indicating the home's degree of efficiency. Energy education is a natural part of the process. After the audit, the user is set three or four specific energy efficiency activities; the evaluation quantifies the potential savings if the recommended activities are completed.

The difference between TVA's In-Home Energy Evaluation (IHEE) and this new program is the funding. The maximum IHEE rebate is $500; this program continues to give rebates as the client continues to make improvements and the score changes. Instant coupons are provided via links. Rebates are determined by the impact of efficiency measures taken and are sent directly to contractors. Energy appliance and lighting retail program incentives will be future additions to the program. The pilot program will launch this summer, and low-income families are eligible to take part.

Tennessee Valley Smart Energy Communities

As previously explained, $20 million is available over a five-year period for homes 20 years or older in low-income communities for Extreme Energy Makeovers (Project B). Project B aims to achieve a 25% energy reduction for each home with an estimated saving of 1,000 megawatt hours per year at approximately $10 per square foot.

One component of Project B is the development of tools and resources for educating consumers and communities on the benefits of efficiency upgrades. In addition to providing each homeowner with training customized for their home, the TVA and its partners will hold public education demonstrations on the broader project and available resources. See Appendix F for more information.

Bill Roundup Program

One option for the community is a Roundup Program offered by KUB targeted at funding weatherization and energy education. This allows customers to round up their utility bills to the next whole dollar, donating the extra cents to support low-income residents. Assuming an average of 50 cents per customer per month is donated, if half of KUB's 200,000 customers participate in this program, then $50,000 per month or $600,000 per year could be raised for weatherization programs and energy education.

For more information on energy efficiency funding and financing programs, please see Appendix F.

Recommendation 4: Fund the program

Create a sustainable and perpetual funding system that addresses all areas of energy efficient housing.

Scope and expected outcomes

Scope

- The KUB should continue to build a strong partnership with the TVA to provide funding for energy efficiency programs for the benefit of Knoxville agencies and citizens
- The Office of Sustainability should proactively develop stronger partnerships with the TVA, KUB, United Way and other agencies/foundations/businesses to secure new funding for community energy education and weatherization
- The City should approach programs that move funding for utility bill assistance toward elevating the quality of housing stock for long-term reduction in energy consumption

Expected outcomes

- Overall improved quality of life for all Knoxville residents with a focus on low-income families
- Elevated quality of housing stock
- Reduced energy usage on the power grid
- Improved community health
- Reduced homelessness
- Creation of green collar jobs

Cost of inaction

- Aging housing infrastructure that will continue to consume energy in excess
- Increased homeless population due to inability to pay utility bills
- Continued drawdown on agency resources for a "band aid" solution
- Millions of dollars wasted annually on a temporary solution that just manages poverty
- Damage to community health

Proposed owner and stakeholders	Suggested resources needed
Owner: City of Knoxville **Stakeholders:** • KUB • TVA • CAC • KHP and other CHDOs • Local community agencies, foundations, businesses, the faith-based community	• Resources and funding for near-term recommendations • Mayor/KUB CEO/TVA CEO leadership **Cost estimate:** High

Recommendation 4: Fund the program (continued)	
Dependencies	**Key milestones, activities and timeframe**
• Recommendation 2 • Recommendation 1	**Horizon 1: 0 - 6 months** • Form funding committee • Develop stronger partnerships to secure funding • The KUB to continue to pursue becoming next pilot site for TVA's new single engagement platform • The KUB to partner with the TVA to secure funds for weatherization as part of Tennessee Valley Smart Energy Communities **Horizon 2: 6 - 12 months** • Investigate and implement models from other cities as benchmarks for programs • Determine potential partnerships between the KUB and local lending agencies to provide low-interest financing • The KUB to consider on-bill financing at low interest rates for low-income KUB customers **Horizon 3: 12+ months** • Assess KUB Cares program for weatherization • Pilot phased approach to move funding for utility bill assistance toward elevating the quality of housing stock • Consider tax credit programs to encourage developers to build low-income housing and help landlords fund efficiency measures
Priority	
High	

Recommendation 5: Engage landlords

The City should create a business registry of landlords. This will require landlords — or their representatives of absentees — to register their properties and comply with enhanced building and maintenance codes. The City should also explore incentives for landlords to weatherize their properties.

Cities have long recognized that in order to deliver sustained affordable housing, including efficient utility services, they must engage with all the stakeholders: tenants, housing and neighborhood development associations and landlords. Having everyone at the table is the only way to ensure that standards are met. In many cities that the Smarter Cities Challenge team examined, stringent codes of conduct are in place to manage the landlord/tenant as well as the City/landlord relationship.

The team held a large number of interviews with City departments and external organizations (see Appendix A for a full list). When asked what kind of relationship the City should have with landlords, the overwhelming response was that the City should put stringent requirements on landlords to make their housing energy efficient, as well as improve its appearance in the neighborhood. While no real data exists for how many rental properties are problematic from a weatherization or blight point of view, some proponents had the number as high as 70%.

The team discovered that the City manages its relationships with building owners and landlords retroactively. Potential problems are identified by community drive-around inspections; full inspections of potentially dangerous buildings are only done when a complaint is registered with the City. Then, through a number of programs, such as the Demolition by Neglect Ordinance, the City deals with owners whose properties pose a health and safety risk to the community. This process averages six to 12 months to complete, meaning that if building occupants had previously applied for emergency utility payment funding, they may have to apply again. By the time this process has begun, the most cost-effective way to deal with the property may well be to demolish it. No work is done to educate the landlords on the value of improving their properties.

A deteriorating house lowers the value of a neighborhood. That means buyers pay less property tax (as that is based on assessed property value), and the City receives less revenue. This downward spiral will not be reversed unless the quality of the housing stock improves, which won't happen until landlords are engaged to become part of the solution.

Examples from other cities

The team examined a number of cities in order to understand how they manage their relationships with landlords. Below are some highlights. Examples from Nashville, Charlotte, Raleigh and Asheville are explored in more detail in the Appendix G.

Cities examined:

Nashville, TN	Raleigh, NC	Portland, OR
Chattanooga, TN	Charleston, SC	Richmond, VA
Memphis, TN	Charlotte, NC	Chapel Hill, NC
Asheville, NC	Boulder, CO	Louisville, KY

Sources:

Websites, ordinances, studies

- All require landlords to register all their properties with the City. In most cases they are fined if they do not.
- In almost all cases, landlords pay a registration fee annually to the City.
- Some cities escalate penalties for noncompliance and withhold Certificates of Occupancy until penalties and fees are paid.
- In most cases a house cannot be rented until it had been registered with the City.
- The City of Portland provides landlords with a very specific list of requirements they must meet in order to rent out their properties.
- The City of Raleigh issues a Probationary Rental Occupancy Permit (PROP) to properties and owners that have a history of repeat violations and noncompliance, emphasizing heavy permit costs and rental restrictions on properties that habitually violate the City Code.
- In Chapel Hill, the operator of every dwelling or unit leased for consideration pays an application fee, based on criteria established in the schedule of fees adopted by the town council for each fiscal year, in order to obtain a license to comply with duties imposed pursuant to minimum housing code license.
- The City of Nashville asks for very detailed information about properties and provides the landlord with a detailed guide to their responsibilities. Raleigh also requires detailed information about properties.
- The City of Asheville provides a deficiencies form to the tenant to review with the landlord before the lease is signed, which must be filed with the City.
- The City of Boulder requires rental units to meet specific energy efficiency ratings after even minor renovations before the unit can be rented out.
- In many cases inspections are done upon vacancy and before the next tenant moves in to ensure the unit complies with local statutes.

The ability to enforce regulations and move quickly to resolve issues requires a city to understand the inventory and ownership status of its rental stock.

Managing the relationship with landlords and owners through more stringent regulations is not the only answer. Some cities also educate landlords on topics ranging from how to select and manage tenants (Raleigh, Portland) to the very specific codes the landlord must meet to be in compliance with City regulations (Nashville, Chattanooga). Seminars are run annually.

Finally, a number of cities are looking at how they might incentivize landlords to weatherize their properties. Many offer low-interest loans, but they seem to have minimum success. Some landlords who feel compelled to weatherize their properties take advantage of incentive programs, but they are more commonly used by owner-occupiers.

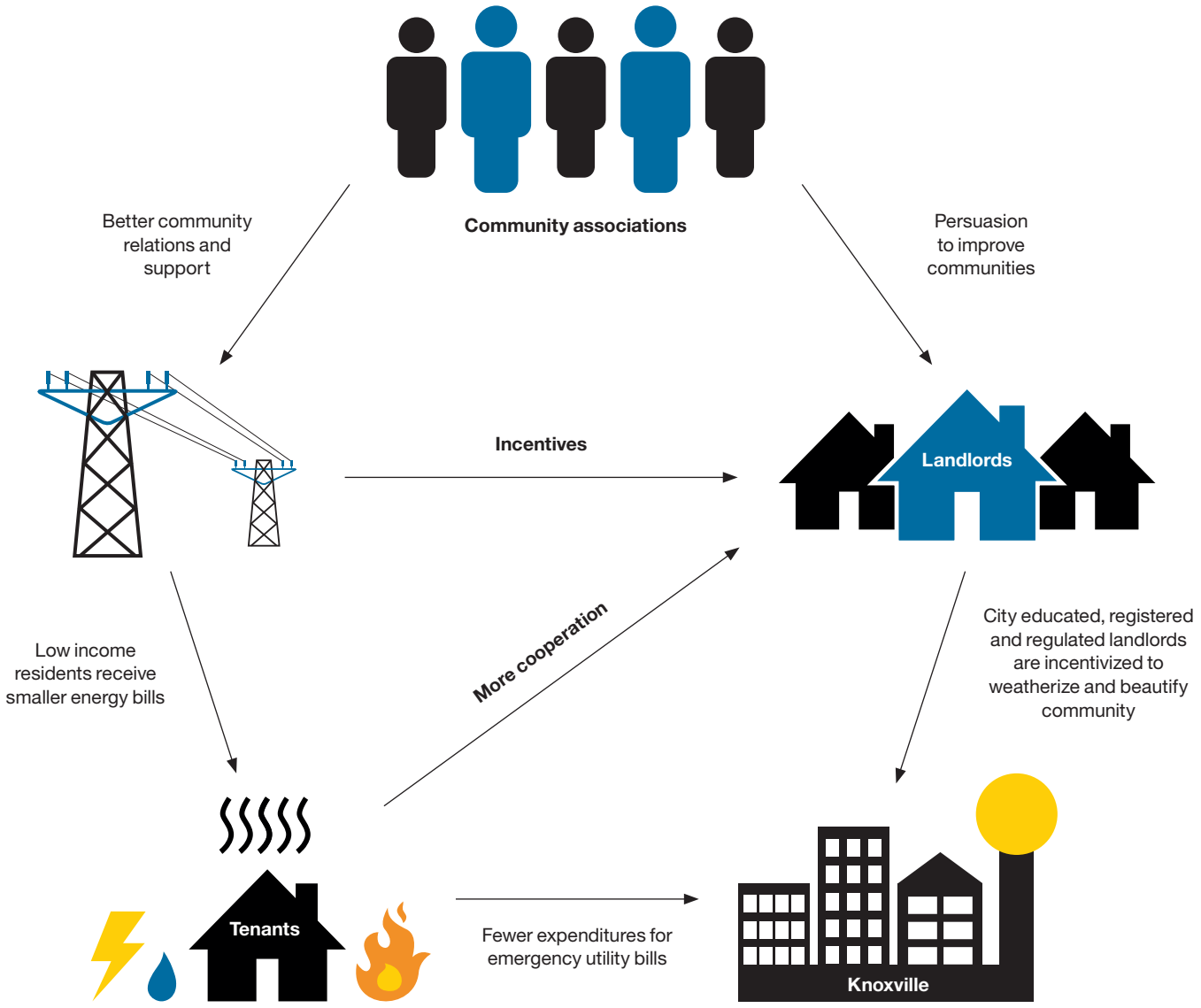


Figure 6:
Cycle of better communities through landlord collaboration

The City should take the following actions, starting with participation incentives and moving to stricter regulation if incentives fail to get the desired results:

Establish a rental property registry. The City needs to know who owns properties and where they are. The registry would contain the owner's name and address, or that of their representative, and list all properties under their management. Along with information about properties that have received emergency utility bill payments from the KUB, this would create the inventory information that is vital in managing weatherization in a cost-effective manner. It would also identify concretely where — or who — the problems are. The City should not need to charge a fee at this point, but registration should be mandatory. As an incentive to enroll, the City should provide education to landlords around tenant relationships and the value of keeping the property in good shape. Portland and Nashville have done this well. State legislature buy-in is a prerequisite for this recommendation.

Establish a roundtable committee to engage landlords and community associations in regular meetings on the issues and solutions relating to blight or at-risk properties. Getting community associations to identify areas for improvement proved effective in Memphis and Portland. Getting the tenants to identify problems is also a proven method, as seen in Asheville and Louisville (see p. 17).

Consider using fees and penalties if, and likely when, incentives are not enough to get cooperation from landlords. The State of Tennessee currently allows only a $10 per landlord registration fee. Fees from the registry could be used to fund any number of programs designed to improve the efficiency of Knoxville's housing stock. The registry and landlord incentive and education programs should be tightly coupled with existing programs and City services that deal with derelict properties and code violations. Nashville is currently charging a registration fee, and Memphis has created an ordinance to allow it to do the same.

Examine the use of additional incentives for landlords to improve/weatherize their properties. A possible solution could be a one-time property tax rebate to cover some of the costs. The City should also examine using back taxes to fund further weatherization, especially if the funds have been written off the books. This would reduce future revenue needs as emergency utility payments would be reduced.

Figure 6 demonstrates how more collaboration with landlords and community stakeholders would lead to a more positive situation.

Without a formalized landlord/City relationship that provides a balance of incentives and regulations, the City and nonprofit organizations will continue to spend an increasing amount of money on emergency utility payments, and the housing in which low-income people live will not improve.

Recommendation 5: Engage landlords

The City should create a business registry of landlords, requiring them to register properties and comply with enhanced building and maintenance codes. It should also create incentives for landlords to weatherize their properties.

Scope and expected outcomes

Scope

The City should:

- Form a committee with landlords and the community and begin to identify and solve issues around creating energy efficient and healthy communities
- Create a registry or licensing vehicle for all landlords, whether local or absentee
- Implement a nominal licensing fee and penalty-based regulations if incentives and cooperation do not work
- Create an education program to help landlords manage tenants and properties better as an incentive for registering
- Develop incentives to entice landlords to improve their properties, through one-time tax rebates or other means

Expected outcomes

- A complete inventory of properties for rent in Knoxville, including by whom they are owned or managed
- Useful information with which to engage landlords collaboratively and an enforcement vehicle to ensure they are managing their properties responsibly
- The amount of money spent on emergency utility bills will drop, and the quality of housing stock will improve

Cost of inaction

The City will continue to pay for emergency utility bills as the housing stock continues to deteriorate. Without legitimate enforcement, landlords will not see the need to become part of the solution, leaving City programs to fund work like weatherization that should be the responsibility of the building owner.

Proposed owner and stakeholders

Owner

- City of Knoxville
- Chamber of Commerce

Stakeholders: Neighborhood associations

Suggested resources needed

- A simple portal for landlords to register their properties
- Education for landlords

Cost:
Low/medium

Dependencies

- Recommendation 2
- Potential bylaw or ordinance changes

Key milestones, activities and timeframe

Horizon 1 (0 - 6 months):

- **Immediate:** Create a communities and landlords committee. Announce the landlord registry.
- **2 months:** Put portal in place to register properties.

Horizon 2 (6 - 12 months):

- **6 months:** Begin delivering landlord education and determine best means of dealing with uncooperative landlords. Begin developing incentive plans.
- **9 months:** Deal with delinquent landlords and announce weatherization incentives.

Priority

High

5. Conclusion

The City will achieve sustainable energy efficiency targets through its commitment to collaboration and business-friendly practices and by engaging the landlord community. The City should leverage its academic and community assets to create a long-term solution that delivers education. In the future, the City should engage all its constituents and gain buy-in for a citywide campaign to create a stronger Knoxville. Through the system of systems, the City will make fact-based decisions on how to best spend its precious resources.

6. Appendix

A. Acknowledgments

Name	Title	Organization
Ken Block	Project Developer	Knox Housing Partnership Inc.
Teri Brahms	Executive Director	Pellissippi State Community College, Business and Community Services
Michael Dunthorn	Chronic Homeless Advisor	City of Knoxville
Jason Estes	Director of Rehabilitation and Construction Services	Knoxville-Knox County Community Action Committee
Betsy Ford	Environmental Stewardship	Knoxville Utilities Board
Dale Grubbs	Project Help	Knoxville Utilities Board
Steve Noe	Consumer Efficiency Programs	Knoxville Utilities Board
Barbara Kelly	Executive Director	Knoxville-Knox County Community Action Committee
Misty Goodwin	Senior Manager	Homeward Bound Program, Knoxville-Knox County Community Action Committee
Jo Madding	Assistant Director	CAC Housing & Energy, CAC — LIHEAP
Cecelia Waters	Director	Center for Energy and Community ServicesLIHEAP, Knoxville-Knox County Community Action Committee
Marie Alcorn	Vice President	Community Engagement & Mobilization, United Way
Gina Whitmore	Director	Compassion Coalition benevolence clearing house, Compassion Coalition
George Bove	Business Manager/Financial Secretary	Local Electrical Union 760
Joyce Floyd	Strategic Planning and Special Projects Director	Knoxville's Community Development Corporation
B.E. Colway	President	Ladies of Charity
Elizabeth Eason		Elizabeth Eason Architecture, US Green Building Council, East TN Chapter
Stan Johnson	Director	SEEED
Dr. David Patterson	Program Director	College of Social Work, University of Tennessee
Deidre Ford		College of Social Work, University of Tennessee
Lisa Higginbotham		College of Social Work, University of Tennessee

Name	Title	Organization
Debbie Taylor-Allen	Director	KCDC — Section 8 Housing
John Tirro	Reverend	St. John's Lutheran Church
Becky Wade	Community Development Director	City of Knoxville
Ginny Weatherstone	Chief Executive Officer	Volunteer Ministry Center & The Refuge
Mary Wilson	Community Planning and Development Director	US HUD
Albert Nelson	Manager	East and North Neighborhood Centers, CAC
Joe Newman	President	Advantage Property Management of Knox, LLC
Hank Helton	Vice President	Pathway Lending
Lynne Liddington	Director of Air Quality Management	Knox County
Jimmy Green	Energy Policy Manager	Southern Alliance for Clean Energy
Jason Woodle	Program Manager	Community Relations, Tennessee Valley Authority
Doug Lawyer	Vice President	Chamber of Commerce
Laurens Tulloch	President	The Cornerstone Foundation
Christi Branscom	Director of Public Works	City of Knoxville
Patricia Robello	Business Liaison	City of Knoxville
David Brace	Deputy Director of Public Services	City of Knoxville
David Massey		Office of Neighborhoods, City of Knoxville
Michelle Martin		Smart Energy Communities, Tennessee Valley Authority
Dawna Aragon		Market Research, Tennessee Valley Authority
Mintha Roach	CEO	Knoxville Utilities Board
Robert M. "Bob" Balzar	Vice President	Energy Efficiency and Demand Response, Tennessee Valley Authority
Tom Chamberlain		Community Programs, MLGW
Shamel Talley	Customer Counselor	Social Services, KUB
Becky Williamson	Strategic Marketing Director	MLGW

B. Team biographies

Rudi Loepp
Public Sector Industrial Solutions Executive

Loepp brings 34 years of experience to the Knoxville Smarter Cities Challenge. During his time at IBM he has held a number of management positions and worked primarily with public sector clients. Currently Loepp has business development responsibility for the IBM Smarter Cities suite of products. As a public sector expert, Loepp is very familiar with the operations of city governments and has helped many to become smarter cities. Loepp has participated in the IBM Corporate Service Corps program in Africa. He enjoys golfing, music and cooking.

Avalyn Pace
Energy and Utilities (E&U) Manager Global Solution Center

Pace is a 30-year veteran with IBM. She works with the E&U industry to address key problems in power generation optimization, intelligent utility networks and customer operations transformation. Pace holds an MBA from Southern Methodist University in Dallas, Texas, and a certification in nonprofit management. She was selected for the 2013 Leadership Dallas program and is a recipient of the Women of Color Technology All Star award.

Debbie Bonner Perkins
Client Services Leader,
IBM Global Technology Services

Perkins provides business value to clients in Tennessee, North Carolina and Virginia. She has supported clients in the industrial, financial services and public sectors, including the State of Tennessee. In her 30-year career with IBM, Perkins has held a number of sales and technical support positions, including Systems Engineer, Client Executive, Software Account Manager and Client Services Manager. She is an active member of the Memphis community, having served on the Board of Directors for Junior Achievement of Memphis and the Mid-South and the University of Memphis Alumni Executive Committee, and as a Leadership Memphis graduate. She works with a number of organizations focused on providing mentoring and leadership skills to young people in underserved areas of the city. Perkins has been recognized with numerous civic awards for her service.

Dr. Anika Schumann
Research Staff Member,
IBM Smarter Cities Technology Centre, Dublin

Schumann leads research efforts on smart buildings, seeking to exploit and advance artificial intelligence methods for fault identification, reduced energy use and increased occupant comfort. She has led work on semi-automatically configuring building energy management systems. Schumann joined IBM Dublin two years ago and has worked at the intersection of smart buildings and artificial intelligence for four years. In that area, she has written several scientific papers, organized international workshops and delivered keynote and invited presentations at European and international venues. Schumann has lived on five continents and has worked at the IBM TJ Watson Research Centre, New York, USA; the University of South Australia; the University of Potchefstroom, South Africa; Infineon AG in Bangalore, India; the Technical University of Munich, Germany; and the Cork Constraint Computation Centre, Ireland.

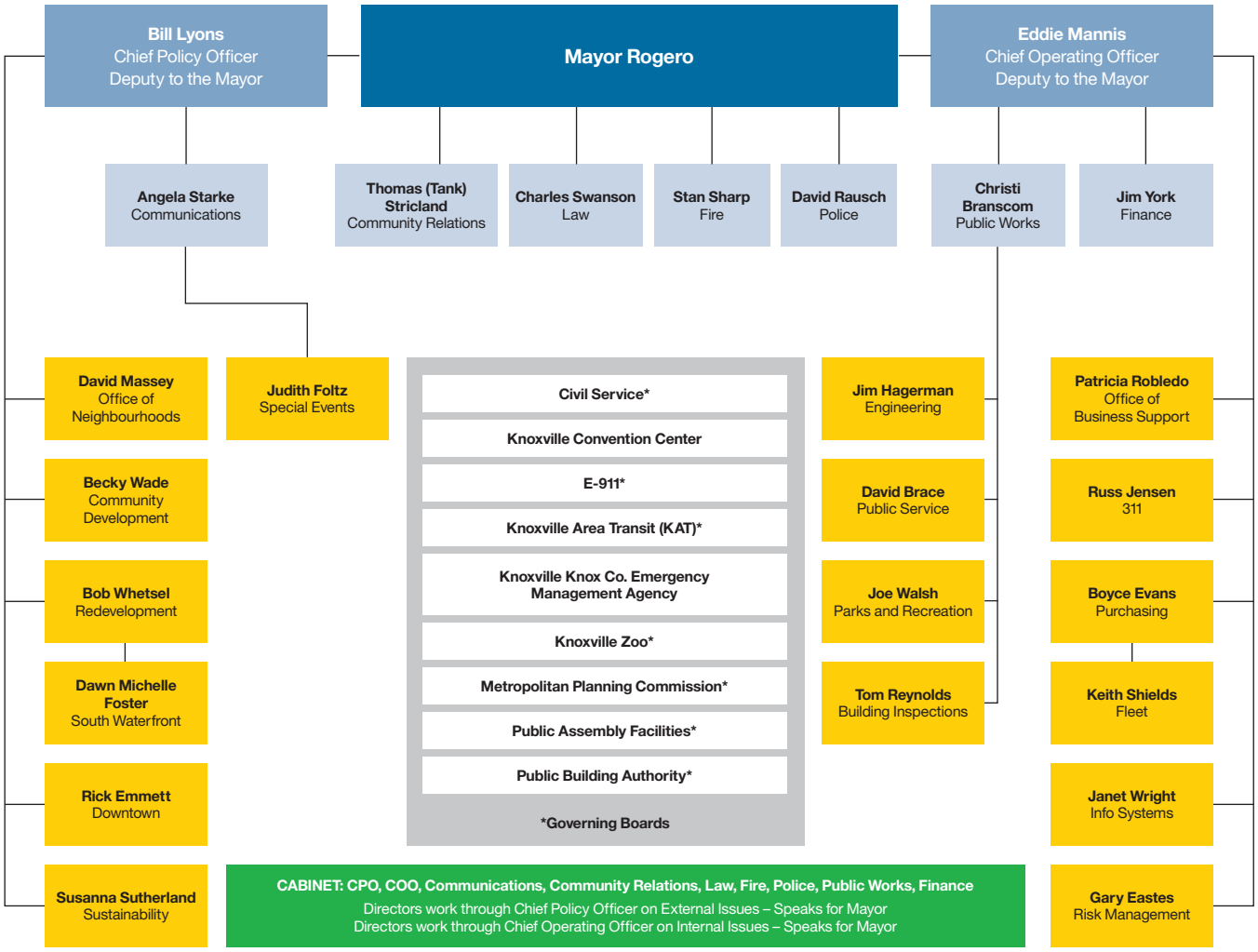
Jeni Vancura
Director of Human Resources
IBM Corporate

Vancura provides strategic support across the realm of HR programs and initiatives for IBM's Finance, Marketing and Communications, Legal, Strategy, CIO and HR organizations. She is the Westchester County Senior Location Executive responsible for sponsoring and planning corporate social responsibility and community events across the county's five Westchester sites, representing IBM internally and externally. Vancura holds an MS degree in organizational management and human resource development from Manhattanville College in Purchase, NY. She has developed skills and experience in effective change-management processes while at IBM. Vancura lives in Sandy Hook, Connecticut. She enjoys traveling, cooking and the outdoors. She also enjoys volunteering her time mentoring veterans who are attempting to reenter the workforce.

Tina Wilson
Corporate Citizenship and Corporate Affairs Manager, IBM Tennessee and North Carolina

Wilson serves as the focal point for IBM's corporate citizenship activity at one of IBM's largest sites. She recently completed the IBM Marketing and Communications Global Leadership Development program. Wilson's background includes serving as Press Secretary for the Lieutenant Governor of North Carolina, Director of Media Relations for the Special Olympics World Summer Games and 10 years in television news as a reporter and producer. Tina has received the Women In Business award from the NC Business Journal and the Order of the Long Leaf Pine award from the Governor of NC, the highest civilian honor awarded by the State of NC for public service.

C. City of Knoxville organizational chart



D. Supporting documents for Recommendation 1: Develop one voice

Former Nashville mayor, Bill Purcell and the City's successful affordable housing initiatives.
– www.joneshawkinsfarmer.com/lawyers/bill-purcell.html
– www.urbanministry.org/files/mayor-purcell-nashville.pdf
– http://portal.hud.gov/hudportal/HUD?src=/states/tennessee/library/archives/features/2003-02-19a
– www.nashville.gov/mc/executive/index_purcell/bp_007.htm

Franklin Tennessee, Sustainable Community Action Plan 2009
– http://franklintn.gov/Modules/ShowDocument.aspx?documentid=1091

Greenprint Denver
– www.greenprintdenver.org/energy-emissions

PlaNYC
– www.nyc.gov/html/planyc2030/html/about/about.shtml

ICLEI's 10 Keys to Sustainability Planning Success
– www.icleiusa.org/action-center/planning/ICLEI_10%20Keys%20to%20Sustainability%20Planning%20Success.pdf

Center for Housing Policy reports and articles:
Keith Wardip, Laura Williams and Suzanne Hague. "The Role of Affordable Housing in Creating Jobs and Stimulating Local Economic Development: A Review of the Literature." January 2011.
– www.nhc.org/media/files/Housing-and-Economic-Development-Report-2011.pdf

Jeffrey Lubell, Rosalyn Crain and Rebecca Cohen. "Framing the Issues—the Positive Impacts of Affordable Housing on Health." July 2007.
– www.nhc.org/media/documents/FramingIssues_Heath.pdf

Maya Brennan: "The Positive Impacts of Affordable Housing on Education: A Research Summary." 2007.
– www.nhc.org/media/documents/Housing_and_Education.pdf

E. Supporting documentation for Recommendation 3: Educate the community

Energy audit toolkit created for volunteers by the Corporation for National Community Service.
– www.serve.gov/toolkits/pdf/audit-home.pdf

ACE Hardware's free consumer workshops in Colorado

– www.xcelenergy.com/About_Us/Energy_News/News_Archive/Ace_Hardware_Stores_host_free_workshops_to_help_consumers_conserve_energy

Lowes Charitable and Educational Foundation
– http://responsibility.lowes.com/community/our-programs/lowes-charitable-and-educational-foundation

City of Portland, Landlord Training Program
– www.portlandonline.com/bds/index.cfm?c=31887

Wisconsin K-12 Energy Education Program (KEEP)
– www4.uwsp.edu/cnr/wcee/keep/AboutKEEP/about.htm

United Way
– www.uwgk.org

Summary of Knoxville weatherization/energy efficiency education – (past, existing and potential for future)

Providing organization	Description	Proactive/ reactive	Delivery method	Frequency	Comments
CAC (Housing and Energy: J. Estes, J. Madding)	Previously provided hands-on education, but state stopped and now provides an education kit with light bulbs and pamphlet on general ways to save	Reactive (for those who get services)	Kit handed out to program recipients	As program service	Would like to implement more proactively and provide thorough education for those receiving services, for example, prior to buying a home or having it weatherized; if receiving assistance come to CAC for quarterly educational sessions, partnering with Home Depot and others, use incentives; can also partner more with the KUB — understand costs and provide continuous education
Compassion Coalition (G. Whitmore)	Provides training to churches to ensure they are aware of and connected to the right social services	Proactive for churches in coalition (215 of 700 in Knoxville)	Volunteers meet with church members	As members join and otherwise as needed	Can't forget about educating churches or they will continue giving money without referring to proper social service agencies
United Way (UW) (M. Alcon)	Potential grant for weatherization services and education — would like to see energy education for K-12 (closer to 12) as teenagers get closer to home residency				Next grant assessment cycle will be in 2014; CAC would be appropriate organization to put forward a proposal; suggest positioning in partnership with the KUB and focusing on 3 UW areas: income, health and education
KHP (K. Block)	When building LEED home, there is rigorous 2-hour training for homebuyer. Created a proposal for a community energy and environmental education center as part of Park City neighborhood project.	Reactive	In person with new homeowner	As needed	Park City proposal was stalled due to stimulus funds directives
KCDC (J. Floyd, D. Taylor-Allen)	Provide energy efficiency training and KUB billing process to public and Section 8 housing though delivered differently depending on public or Section 8	Some proactive, some reactive	Public housing is delivered on property sites by Ameresco annually; for Section 8, the KUB delivers regular 15-minute sessions as part of KCDC voucher briefing	Annually for public housing; 2-3 times/ month for Section 8	Turnout is low for public housing, try to provide incentives/prizes, but still low; Section 8 briefing is mandatory upon receipt of voucher

Providing organization	Description	Proactive/ reactive	Delivery method	Frequency	Comments
KUB: general and Project Help (D. Grubbs)	Education is available through agency meetings and flier handouts; also requires anyone who receives assistance to go through energy efficiency class and receive education kit in partnership with CAC	Reactive (agencies request through speaker's bureau)	Delivered in person by social worker	On request	Not sure if education is always understood. Education campaign needs to be driven by City or Chamber of Commerce. Could support higher demand to some extent; could do train the trainer; should educate kids; hesitant to use social media too much so save for critical emergency information, for example, power outages; need more "trusted advisor" approach for senior citizens — CAC helps
CAC (LIHEAP, other, C. Waters, M. Goodwin, B. Kelly)	Previously conducted regular energy workshops for residents ready to have homes weatherized, now that ARRA funds are gone, done only on occasion	Reactive	Delivered in person at CAC	As feasible	Would love to expand education if funding available
Pellissippi State Community College (T. Brahams)	Education is focused on craft trade skills, but not many enrollments since the TVA hired contractors from DC; potential for using internships and/ or new service learning component to partner with CAC (Estes) on home assessments and occupant education; 30 hour credit apprentice program another possibility				Challenge with using internships is students expect to be paid
CAC East and North Neighborhood Centers (A. Nelson)	Provides local residents with basic education on bill interpretation, weatherization sign-up process and basic efficiency tips	Reactive	Delivered in center by CAC social worker	As residents come into center	

Providing organization	Description	Proactive/ reactive	Delivery method	Frequency	Comments
Nashville Energy Initiative (H. Helton)	Large scale public education initiative to provide weatherization DIY basics and application assistance, as well as workshops in local community centers				
Step-Up Apprenticeship (J. Newman)	Done in Fort Lauderdale — one of the most successful apprentice programs in the nation for underprivileged youth — worked on housing				
SEEED (S. Johnson)	Apprentice program in Knoxville (very similar to Step-Up) to train young adults in weatherization and home energy skills — they go to low-income neighborhoods and provide assessments and education	Proactive	Fliers providing advance notice they will be in neighborhood or can schedule appointment, then follow up with door-to-door to 50-100 homes for in-house assessment and guidance	Program just started	Very interested in participating in City's initiative by providing resources, as well as participating in the planning
Electrical Union (G. Bove)	No current training for public, but potential for his contractors to educate on electric efficiency tips				

F. Supporting documentation for Recommendation 4: Fund the program

Energy efficiency funding and financing programs

Tennessee Valley Smart Energy Communities
– www.tva.com/environment/epa_mitigation/smart_energy_communities.htm

City of Knoxville, Consolidated Annual Performance and Evaluation Report. 2011-2012
– www.cityofknoxville.org/development/currentdocs/final_caper_2011-2012.pdf

City of Knoxville, Third Year Annual Action Plan
– www.cityofknoxville.org/development/currentdocs/2012-13_aaplanfinal.pdf

MLGW Green Initiatives 2011 Annual Report
– www.mlgw.com/images/content/files/pdf/GreenInitiativesAnnualReport2011_web.pdf

MLGW, Project CARE, Race to CARE
– www.mlgw.com/community/projectcareracetocare

Weatherization & Intergovernmental Program
– www1.eere.energy.gov/wip/wap.html

JPB Foundation

Environmental issues are the JPB Foundation's newest field of interest. To meet its goal, the foundation will begin by exploring the energy system. Initially, the projects it supports may focus on low-income housing and how retrofits of this housing stock can enable healthy and resilient communities.
– http://jpbfoundation.org

On-Bill Repayment Programs. Financing information from US Department of Energy.

– www1.eere.energy.gov/wip/solutioncenter/onbillrepayment.html

State of Tennessee department that handles loans or incentives connected to energy issues:

Katie Southworth
Program Manager, Office of Energy Programs
TN Department of Environment & Conservation
401 Church Street, 11th FL
Nashville, TN 37243

PACE

Land-based loans for funding energy efficiency programs for commercial and residential buildings.

Tennessee is not currently a participant; state legislation is required.
– http://pacenow.org/act-now/make-pace-happen

Jeremy Hayes. "The Hidden Risk to America's Affordable Housing, and How We Can Solve It." Green for All on MPower plan to weatherize apartment units where tenants share in cost of weatherization. Bills do not go up; utility savings are used to pay the loan.
– http://greenforall.org/?post=the-hidden-risk-to-americas-affordable-housing-and-how-we-can-solve-it#more-11264

FAHE
Pinnacle bank model — collaboration with Federation of Appalachian Housing for low interest loans.
– www.cityofknoxville.org/citycouncil/agenda/11a.pdf
– www.fahe.org/about-fahe

Memphis Light, Gas and Water - Energy Assistance
– www.mlgw.com/plus1

EnergySmart Memphis
Energy education, weatherization, social services; partnership with MLGW, TVA, Shelby County CSA, Memphis Public Library and Information Center, CDCs, Metropolitan Inter-Faith Association.
– www.mlgw.com/residential/energysmartmemphis

On Track
Education, financial management and social services.
– www.mlgw.com/residential/ontrack

Plus-1
$1 donations from utility customers (similar to KUB Project Help).
– www.mlgw.com/residential/plus1

Gift of Comfort
Allows individuals to make a payment toward a customer's utility bill as a gift.
– www.mlgw.com/residential/giftofcomfort

Budget Billing
Average billing program
– www.mlgw.com/residential/budgetbilling

KCDC Annual Savings Measurement and Verification Report
Year Four – July 1, 2011 through June 30, 2012
– www.kcdc.org/Libraries/CURRENT_News/KCDC_Savings_Report_Yr_4_Jul11_Jun12_10-31-12.sflb.ashx

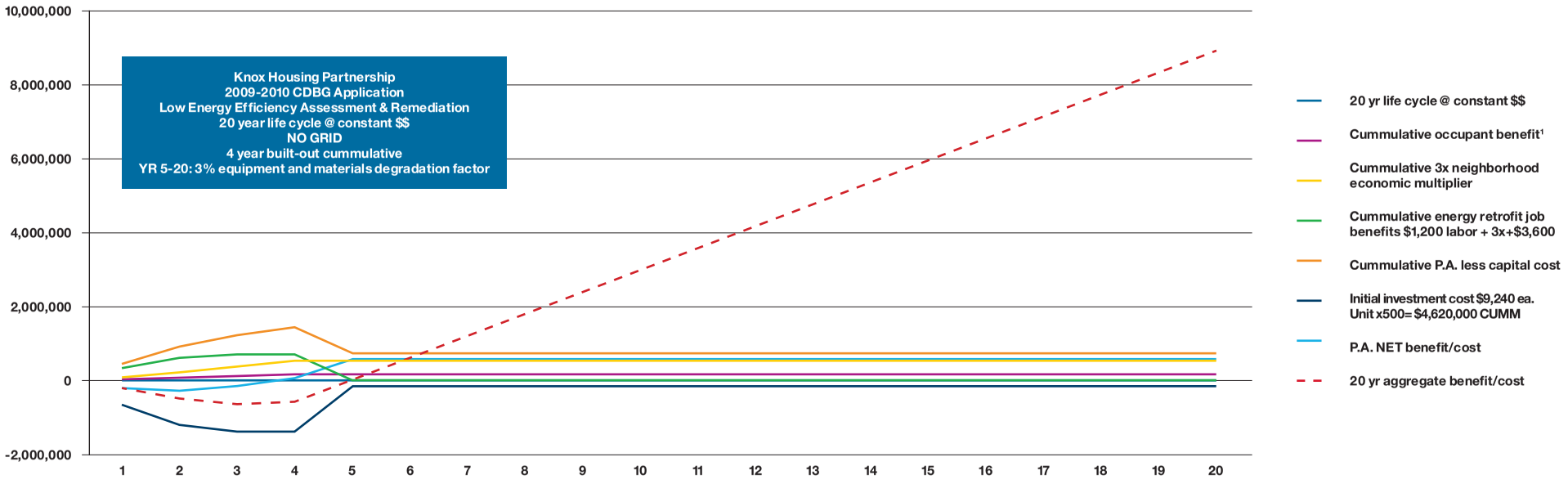
Knox Housing Project Park City Neighborhood Information

Knox Housing Partnership Project (Park City Neighborhood) Retrofit Results

Address	Test-In	Test-Out	Net Var.	% Var.	HERS-IN	HERS-OUT
2200 Chester	$2,395	$1,145	$(1,250)	-52%	177	98
2019 Trigg	$2,580	$1,667	$(913)	-35%	177	139
3210 Wilson	$1,798	$1,505	$(293)	-16%	178	144
2601 Linden	$1,730	$1,346	$(384)	-22%	146	106
2854 Gardenia Dr	$1,726	$1,471	$(255)	-15%	131	107
3009 Boyds Bridge	$1,671	$1,340	$(331)	-20%	167	96
515 Ben Hur	$6,148	$3,205	$(2,943)	-48%	260	117
1825 Laurans	$2,087	$1,905	$(182)	-9%	144	129
2912 Hillside	$2,113	$1,888	$(225)	-11%	186	156
2209 Chester	$1,371	$1,286	$(85)	-6%	124	114
1005 Dartmouth	$2,021	$1,590	$(431)	-21%	144	108
915 Biddle	$2,301	$1,705	$(596)	-26%	179	128
2815 Jefferson	$1,991	$1,735	$(256)	-13%	140	122
1925 Granville Terrace	$2,509	$2,070	$(439)	-17%	155	127
126 Van Glider	$3,911	$2,649	$(1,262)	-32%	200	135
305 Jamey	$1,953	$1,355	$(598)	-31%	145	101
3846 Skyline	$1,909	$1,659	$(250)	-13%	222	195
3015 Sanland	$2,203	$2,068	$(135)	-6%	166	159
1438 Patricias Circle	$2,122	$1,839	$(283)	-13%	133	117
1957 Rosedale	$2,046	$1,706	$(340)	-17%	180	159
2820 Boyds Bridge	$1,988	$1,682	$(306)	-15%	142	127
2317 Dillon	$1,598	$1,445	$(153)	-10%	123	117
507 Ben Hur	$2,313	$1,613	$(700)	-30%	157	121
2646 Parkview	$2,697	$2,374	$(323)	-12%	178	163
2336 Linden	$1,809	$1,626	$(183)	-10%	136	119
3702 Speedway	$1,646	$1,460	$(186)	-11%	145	135
1129 S. Elmwood	$1,489	$1,336	$(153)	-10%	128	116
1710 Hazen Street	$1,752	$1,459	$(293)	-17%	151	128
2405 Center Avenue	$2,905	$2,199	$(706)	-24%	226	172
	$64,782	**$50,328**	**$(14,454)**	**-22%**	**163**	**129**

Knox Housing Partnership 20-Year Life Cycle Savings Projection

20 yr life cycle @ constant $$	(70ea.) 1	(130ea.) 2	(150ea.) 3	(150ea.) 4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Cummulative occupant benefit[1]	$25,620	$73,200	$128,100	$183,000	$183,000	$183,000	$183,000	$183,000	$183,000	$183,000	$183,000	$183,000	$183,000	$183,000	$183,000	$183,000	$183,000	$183,000	$183,000	$183,000
Cummulative 3x neighborhood economic multiplier	$76,860	$219,600	$384,300	$549,000	$549,000	$549,000	$549,000	$549,000	$549,000	$549,000	$549,000	$549,000	$549,000	$549,000	$549,000	$549,000	$549,000	$549,000	$549,000	$549,000
Cummulative energy retrofit job benefits $1,200 labor + 3x+$3,600	$336,000	$624,000	$720,000	$720,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NO Utility grid benefit	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Cummulative P.A. less capital cost	$438,480	$916,800	$1,232,400	$1,452,000	$732,005	$732,006	$732,007	$732,008	$732,009	$732,010	$732,011	$732,012	$732,013	$732,014	$732,015	$732,016	$732,017	$732,018	$732,019	$732,020
Initial investment cost $9,240 ea. Unit x500= $4,620,000 CUMM	-$646,800	-$1,201,200	-$1,386,000	-$1,386,000	-$138,600	-$138,600	-$138,600	-$138,600	-$138,600	-$138,600	-$138,600	-$138,600	-$138,600	-$138,600	-$138,600	-$138,600	-$138,600	-$138,600	-$138,600	-$138,600
P.A. NET benefit/cost	-$208,320	-$284,400	-$153,600	$66,000	$593,405	$593,406	$593,407	$593,408	$593,409	$593,410	$593,411	$593,412	$593,413	$593,414	$593,415	$593,416	$593,417	$593,418	$593,419	$593,420
20 yr aggregate benefit/cost	-$208,320	-$492,720	-$646,320	-$580,320	$13,085	$606,491	$1,199,898	$1,793,306	$2,386,715	$2,980,125	$3,573,536	$4,166,948	$4,760,361	$5,353,775	$5,947,190	$6,540,606	$7,134,023	$7,727,441	$8,320,860	$8,914,280



G. Supporting Documents for Recommendation 5: Engage landlords

City of Louisville, Housing Summit — Problems and Challenges:
– www.louisvilleky.gov/NR/rdonlyres/495C165B-A763-44AB-AF7F-03253309B644/0/RawHousingSummitTranscriptionData.pdf

City of Louisville, Housing Summit — The Outcome:
– www.louisvilleky.gov/NR/rdonlyres/77D8CF2E-37C5-49BC-B27E-48A1A100E3E7/0/FinalCombinedDocument62211.pdf

City of Asheville, Rental Walkthrough Form:
– www.ashevillenc.gov/Portals/0/city-documents/Development%20Services/Inspections_and_Enforcement/Housing_Code_Inspections/walkthrough.pdf

City of Nashville, Landlord Registration Form:
– www.nashville.gov/Portals/0/SiteContent/Codes/docs/public_docs/Landlord%20Registration%20Form.pdf

City of Nashville, Metro Codes & Building Safety:
– www.nashville.gov/Portals/0/SiteContent/Codes/docs/public_docs/PS%20General%20Flyer%20Ver%202.pdf

City of Charlotte, Rental Registration and Inspection Program Report:
– http://charmeck.org/city/charlotte/CityClerk/CouncilRelated/AgendaArchive/2006/Documents/01090605.pdf

City of Raleigh, Rental Dwelling Registration:
– www.raleighnc.gov/home/content/Inspections/Articles/RentalDwellingRegistra.html

City of Portland, Top 25 Basic Requirements for Housing Units:
– www.portlandonline.com/shared/cfm/image.cfm?id=25567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Toccoa
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